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North Central Montana District

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March 13, 2018 Oil and Gas Lease Sale

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CHAPTER 1 - PURPOSE AND NEED FOR ACTION

1.1 Introduction & Background

The Bureau of Land Management (BLM) Montana/Dakotas State Office conducts Oil and Gas Federal mineral estate lease auctions for lands managed by the Federal Government, whether the surface is managed by the Department of the Interior (BLM or Bureau of Reclamation), United States Forest Service, or other departments and agencies. These auctions also include split estate lands, where the BLM holds subsurface mineral rights, but a party other than the Federal Government owns the surface estate. The Montana/Dakotas State Office has historically conducted four lease sales per year. The BLM's authority to conduct these lease sales is based on various laws including, the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing.

Members of the public file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. From these EOIs, the Montana/Dakotas State Office provides draft parcel lists to the field offices for review. The nominated parcels carried forward for analysis are further reviewed by the field office to determine:

1) if they are in areas open to leasing;
2) if new information has come to light which might change previous analyses conducted during the land use planning process;
3) if there are special resource conditions of which potential bidders should be made aware;
4) and which stipulations should be identified and included as part of a lease.

This environmental assessment (EA) has been prepared to disclose and analyze the potential environmental consequences from leasing 24 nominated lease parcels encompassing approximately 6,892 Federal mineral acres located in the Malta, Havre, and Glasgow Field Offices, to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on March 13, 2018. The analysis area includes the seven counties with nominated parcels in Glacier, Liberty, Hill, Chouteau, Blaine, Phillips, and Valley counties (See parcel maps in **Appendix C**).

1.2 Purpose and Need

The purpose and need for this action is to respond to Expressions of Interest to lease parcels of land for oil and gas development as mandated by Federal laws, including the Mineral Leasing Act of 1920, Federal Land Policy and Management Act of 1976, and Federal Onshore Oil and Gas Leasing Reform Act of 1987. Based on this review and public comment, the BLM will determine whether to recommend these lease parcels for competitive oil and gas lease sale and, if so, what stipulations or lease notices would apply to these parcels. Offering parcels for competitive oil and gas leasing provides opportunities for private individuals or companies to explore and develop federal oil and gas resources after receipt of necessary approvals, and to sell the oil and gas in public markets.

1.3 Proposed Action

The Proposed Action would be to offer 24 lease parcels of Federal minerals for oil and gas leasing, covering approximately 6,892 Federal mineral acres (4,942 acres BLM administered surface and 1,950 acres private surface) Glacier, Liberty, Hill, Chouteau, Blaine, Phillips, and Valley counties. Refer to Chapter 2 for additional information.

1.4 Decision to be Made

The responsible official will determine whether or not to offer oil and gas leases on the lease parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

1.5 Conformance with Land Use Plan

This EA is tiered to the information and analysis and conforms to the decisions contained in the 2015 Rocky Mountain Region Record of Decision (ROD) and HiLine Approved Resource Management Plan (HiLine ARMP). The HiLine ARMP, and associated FEIS, is the governing land use plan for the HiLine District, including the Glasgow, Malta, and Havre Field Offices. An electronic copy of the HiLine ARMP, ROD, and associated FEIS can be located via the internet on the BLM e-Planning page: https://eplanning.blm.gov/epl-front-office/eplanning/lup/lup_register.do.

BLM resource specialists prepared this EA to document the analysis of the lease parcels and recommended appropriate stipulations based upon professional knowledge of the areas involved, review of current databases, file information, and some site visits. The lease parcels are within areas determined to be open to oil and gas leasing in the HiLine ARMP. Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

Assessment of potential activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed for the HiLine District in the HiLine FEIS (Volume II, pages 450-453 and Appendix E.1, Volume III, pages 1265-1283). An analysis of potential impacts from oil and gas development was analyzed in Chapter 4 of the HiLine FEIS, and is incorporated by reference into this EA. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the HiLine District, and was used to analyze projected wells for the nominated lease parcels.

A detailed site-specific analysis and mitigation of activities associated with any particular lease development would occur when a leaseholder submits an application for permit to drill (APD). A more complete description of mitigation, BMPs, and conditions of approval related to oil and gas lease activities can be found in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book, and online at: http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html.

1.6 Public Involvement

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website, local newspapers, the BLM Montana Dakotas website, and posted online in the National Environmental Policy Act (NEPA) e-Planning website. Scoping was initiated August 14, 2017.

The BLM coordinates with Montana Fish, Wildlife, and Parks (MFWP), and the U.S. Fish and Wildlife Service (FWS) to manage wildlife. While the BLM manages habitat on BLM lands, MFWP is responsible for managing all wildlife species populations. The FWS also manages some wildlife populations but only those federal trust species managed under mandates such as the Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. The BLM mailed letters to FWP and USFWS informing them of scoping and EA comment periods, as well as communicated informally with them to identify wildlife concerns, protective measures, and apply stipulations and lease notices associated with the lease parcels.

The BLM consults with Native Americans under various statutes, regulations, and executive orders, including the American Indian Religious Freedom Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the National Environmental Policy Act, and Executive Order 13175-Consultation and Coordination with Indian Tribal Governments. The BLM sent letters to consulting tribes in Montana seeking comments during the scoping and EA comment periods, informing them of proposed lease sale, and invited them to submit issues and concerns BLM should consider in the environmental analysis. See Section 4.2 for a list of tribes contacted for this project.

The BLM also mailed letters to local, state and federal agencies and private surface owners informing them of the lease sale and seeking comments. The BLM received a a letter from two public interest group that identified a number of concerns related to impacts to multiple resources, including air quality, wildlife, fisheries, water resources, and range resources. All of these resources are analyzed in Chapter 3.

1.7 Resource Issues Identified for Analysis

Analysis issues include resources that are present in proposed lease parcels and/or resources that could be affected by oil and gas leasing. Consistent with Title 43 Code of Federal Regulations 3131.3, the BLM identified lease stipulations for proposed parcels based upon resource concerns that were identified during previous land use planning processes.

The BLM focuses its analysis on "issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). Issues have a relationship with the proposed action; are within the scope of analysis; and are amenable to scientific analysis. The following resources/issues will be analyzed in this EA:

- Air resources, greenhouse gas emission and climate change
- Soil resources

- Water resources (surface water, groundwater, wetlands, floodplains, riparian vegetation)
- Upland vegetation, invasive species, noxious weeds, and grazing
- Wildlife and associated habitat, specifically including
    - Sensitive species, including sage-grouse
    - Other fish and wildlife such as big game and migratory birds
- Fisheries
- Cultural resources and Native American religious concerns
- Paleontological resources
- Recreation and visual resources
- Right of Way for other land uses
- Socioeconomics

1.8 Issues/Resources Considered but Eliminated from Further Analysis

The BLM identified resources that are not present, or that would not be affected by the proposed action. These issues are listed here and are not considered in detail in this EA:

- Locatable and salable minerals,
- Coal
- Hazardous and solid waste
- Lands with wilderness characteristics,
- Special designations (ERMAs, ACECs)
- Wild horse and burros
- BLM Sensitive Plant Species (not present)
- Cave and karst resources,
- Wild and Scenic Rivers; Wilderness Study Areas.
- Forest products

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This EA considers the effects of two alternatives: No Action and the Proposed Action. The Proposed Action is based upon expressions of interest that were submitted to the BLM for the March 2018 oil and gas lease sales.

2.2 Alternatives Considered but Eliminated

Parcel MTM 105431-HQ (Glasgow) was removed from the lease sale pending a decision from the Interior Board of Land Appeals (IBLA) regarding termination of an existing lease. Although a decision was made on the case July 25, 2017, there was not adequate time to determine the validity of the new nomination prior to this lease sale.

2.3 No Action

For EAs on externally initiated Proposed Actions, the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would not be offered for sale.

The No Action Alternative would exclude all 24 lease parcels, covering approximately 6,892 acres Federal mineral acres (4,942 acres BLM administered surface and 1,950 acres private surface), from the competitive oil and gas lease sale. Surface management would remain the same and any ongoing oil and gas development would continue on surrounding Federal, private, and State leases.

2.4 Proposed Action

The proposed action would be to offer 24 lease parcels of Federal minerals for oil and gas leasing, covering approximately 6,892 Federal mineral acres (4,942 acres BLM administered surface and 1,950 acres private surface) in conformance with existing land use planning decisions. The parcels are located in Glacier, Liberty, Hill, Chouteau, Blaine, Phillips, and Valley counties. Parcel number, size, and detailed locations and associated stipulations are listed in **Appendix A**. Maps of the parcels are in **Appendix C**.

For the split-estate lease parcels, the BLM provided courtesy notification to private landowners that the Federal oil and gas estate under their surface would be included in this lease sale. In the event of activity on such split estate lease parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

The terms and conditions of the standard federal lease and federal regulations would apply to each parcel offered for sale in the Alternative. Stipulations shown in Appendix A would be included with identified parcels offered for sale in accordance with the HiLIne ARMP. Standard operating procedures for oil and gas operations on federal leases include measures to protect the environment and resources such as groundwater, air, wildlife, historical and prehistorical concerns, and other resources.

Federal oil and gas leases would be issued for a 10-year period and would remain valid for as long thereafter as oil or gas is produced in paying quantities, required payments are made and lease operations are conducted in compliance with regulations and approved permits. If a lessee fails to produce oil and gas by the end of the initial 10-year period, does not make annual rental payments, or does not comply with the terms and conditions of the lease, the BLM would terminate the lease. The lessee can relinquish the lease. The oil and gas resources could be offered for sale at a future lease sale.

Additional NEPA would be conducted at a site-specific scale prior to approval of an Application for a Permit to Drill (APD), and would include discussion of mitigation measures at the project-specific level to avoid/minimize impacts to resources. Conditions of Approval (COAs) would be attached to permits issued to explore and develop the parcels to address site-specific concerns or new information. Therefore, the proposed action includes stipulations applied to lease parcels but does include site-specific mitigation measures.

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the affected environment (i.e., the physical, biological, and socioeconomic values and resources) and environmental effects to resources that could be affected by implementation of the proposed action. This analysis is tiered to the Hiline District FEIS and ARMP, and the analysis of direct, indirect, and cumulative effects of oil and gas development are incorporated by reference into this analysis.

The HiLine District ARMP determined which areas are available for oil and gas leasing and under what conditions those leases would be offered and sold. All of the lease parcels included in the proposed action are within areas that are open to oil and gas leasing in the HiLineARMP.

Analysis of the lease parcels is documented in this EA, and was conducted by HiLine District resource specialists who relied on professional knowledge of the areas involved, review of current databases, file information, and prior site visits to ensure that appropriate stipulations were recommended for a specific parcel.

Unless otherwise noted in the analysis of a specific resource, the analysis area includes the 24 nominated lease parcels encompassing approximately 6,892 Federal mineral acres Glacier, Liberty, Hill, Chouteau, Blaine, Phillips, and Valley counties (See maps in Appendix C). The temporal scale of effects includes the 10-year period of a lease term, unless the lease is held by production, in which case the temporal scale is extended to the life of the producing well. If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years). Long-term impacts are those that would substantially remain for more than five years.

3.2 Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in the RFD developed for the HiLine FEIS (Volume II, pages 450-453) and Appendix E.1 (Volume III, pages 1265 - 1283), and is incorporated by reference into this EA. The RFD contains the number of potential oil and gas wells that could be drilled and produced in the HiLine area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area. For the HiLine planning area, the selected alternative was Alternative E.

The HiLine planning area contains about 15,873,473 surface acres of all mineral ownership types. Total federal oil and gas mineral ownership, in the HiLine planning area, amounts to about 4,307,538 acres, or about 27 percent of total acres. Bureau-managed oil and gas mineral lands are lowest in Glacier County (about 6,165 acres), Liberty County (about 53,964 acres), Hill

County (about 72,419 acres), Chouteau County (about 112,272 acres) and Toole County (about 113,879 acres). The remaining three counties (Blaine, Phillips, and Valley) contain the remaining 3,121,468 acres of Bureau-managed oil and gas mineral lands. Together this amounts to 3,480,167 acres of Bureau-managed oil and gas mineral lands.

Between January 2002 and March 2007, 402 new wildcat wells (exploratory wells drilled in an area with no existing production) were drilled and completed across the HiLine planning area. Of the 402 wildcat wells, 288 wells (72 percent) were successful and the rest were abandoned. Thirty-four operators were responsible for the 402 wildcat wells. In 2006 there were a total of 8,088 active or producible oil and gas wells in the planning area (Table 1). About 69 percent of the wells are either producing oil or gas wells.

Table 1*: Total number of active federal, tribal, private, and state wells (excluding service, injection, water source, gas storage, unknown, completed, spud, and abandoned status wells) in the HiLine Planning Area. Toole County (2,738 wells) accounts for almost 34 percent of the total wells (8,088). Data are from the Montana Oil and Gas Conservation Division (2006b)*

County	Producible Gas Wells	Gas Shut-In Wells	Producible Oil Wells	Oil Shut-In Wells	Total Active Oil and Gas Wells	Total
Blaine	707	250	52	59	4	**1072**
Chouteau	112	37	0	0	0	**149**
Glacier	228	57	496	520	30	**1331**
Hill	528	143	0	1	2	**674**
Liberty	180	84	83	63	2	**412**
Phillips	1477	62	0	0	3	**1542**
Toole	791	230	758	950	9	**2738**
Valley	107	11	43	9	0	**170**
Total Wells	**4130**	**874**	**1432**	**1602**	**50**	**8088**

Table 2 shows wells completed (producers and dry holes) per year and presents the resultant failure rate for these wells from 1990 through 2006. The fewest wells (96 wells) were drilled in 1996 and the most wells (286 wells) were drilled in 2006. A total of 3,631 wells (excluding service, injection, and temporarily abandoned wells) were drilled during the 17-year time period. There were 2,767 gas completions, 204 oil completions, and 660 dry holes. About 93 percent of the successfully completed wells were natural gas completions. The failure rate for the 16-year time period averaged 18 percent. The failure rate has varied from a low of 11 percent in 2004 to a high of 32 percent in 1994. The failure rate has been lower from 2000 through 2006, due to the large number of development wells that have been drilled. During this period, the failure rate has been only 15.4 percent.

Table 2: *Annual well completions (excluding service, injection, and temporarily abandoned wells) from federal, tribal, private, and state wells in the HiLine Planning Area. Data are from the Montana Oil and Gas Conservation Division (2006b and 2007).*

Year	Producible Oil Well/Oil Shut-In	Producible Gas Well/Gas Shut-In	Dry	Yearly Total	Percent Failure
1990	7	184	53	244	22
1991	25	151	36	212	17
1992	19	136	52	207	25
1993	17	83	27	127	21
1994	22	86	51	159	32
1995	8	65	27	100	27
1996	31	43	21	96	22
1997	10	166	30	206	15
1998	11	134	29	168	17
1999	6	173	47	226	21
2000	2	232	35	269	13
2001	13	212	45	270	17
2002	9	213	39	261	15
2003	7	195	48	250	19
2004	1	244	30	275	11
2005	4	215	51	270	19
2006	12	235	39	286	14
Totals	**204**	**2767**	**660**	**3626**	

Table 3 shows the annual natural gas production (excluding associated gas) for each county since 1990 (Montana Oil and Gas Conservation Division, 2006b and 2007). In 2006, the HiLine planning area produced 56.3 billion cubic feet of natural gas. Natural gas production, within the planning area, was 61 percent of Montana's total natural gas production. Table 4 shows the annual oil production (per county) from federal, tribal, private, and state wells in the HiLine Planning Area.

Table 3: *Annual natural gas production (excluding associated gas), per county, from federal, tribal, private, and state wells in the HiLine Planning Area. Associated gas accounts for less than one percent of the annual natural gas production in this area. Values are thousand cubic feet of gas. Data are from the Montana Oil and Gas Conservation Division (2006b and 2007).*

Year	Blaine	Chouteau	Glacier	Hill	Liberty	Phillips	Toole	Valley	Total Annual Production
1990	13,556	1,104	2,751	6,536	1,667	6,473	7,427	427	**39,941**
1991	13,087	1,088	2,927	7,024	1,847	7,983	7,456	900	**42,312**
1992	13,218	872	2,773	8,007	1,985	9,313	7,249	620	**44,037**
1993	13,194	838	2,852	8,343	1,986	9,991	7,639	498	**45,341**

Year	Blaine	Chouteau	Glacier	Hill	Liberty	Phillips	Toole	Valley	Total Annual Production
1994	12,081	686	2,691	8,047	1,523	8,697	7,359	1,011	**42,095**
1995	11,558	884	2,341	8,556	1,597	8,758	6,541	827	**41,062**
1996	12,030	832	2,183	8,381	1,825	9,298	5,778	1,143	**41,470**
1997	12,445	892	2,093	9,081	1,743	11,158	5,342	1,226	**43,980**
1998	12,850	1,112	1,994	10,580	1,701	11,980	5,198	1,013	**46,428**
1999	13,129	1,057	1,836	11,682	1,481	11,904	4,906	992	**46,987**
2000	17,070	1,539	1,753	11,620	1,727	12,784	4,507	887	**51,887**
2001	18,723	1,841	1,779	13,062	1,895	13,899	4,458	1,106	**56,763**
2002	17,067	2,298	1,802	12,167	2,539	14,335	4,329	1,300	**55,837**
2003	14,374	2,447	1,849	12,680	2,317	15,818	4,377	1,095	**54,957**
2004	13,567	2,298	1,739	13,339	2,046	17,164	4,126	1,144	**55,423**
2005	12,820	2,043	1,620	14,099	2,171	18,025	4,101	1,141	**56,020**
2006	13,966	1,732	1,596	14,130	1,951	17,756	4,080	1,076	**56,287**

Table 4: *Annual oil production (per county) from federal, tribal, private, and state wells in the HiLine Planning Area. Two counties (Chouteau and Phillips) do not report any oil production. Values are thousand barrels of oil. Data are from the Montana Oil and Gas Conservation Division (2006b and 2007).*

Year	Blaine	Chouteau	Glacier	Hill	Liberty	Phillips	Toole	Valley	Total
1990	186	0	1,039	0	186	0	611	314	**2,336**
1991	312	0	1,041	1.052	182	0	615	286	**2,437**
1992	372	0	947	2.352	171	0	582	302	**2,376**
1993	306	0	850	0.74	174	0	506	288	**2,125**
1994	274	0	853	0.739	168	0	414	253	**1,950**
1995	255	0	755	0.819	160	0	379	250	**1,800**
1996	282	0	727	0.645	141	0	359	205	**1,715**
1997	261	0	714	0.497	134	0	370	188	**1,667**
1998	231	0	674	0.49	118	0	360	168	**1,551**
1999	233	0	621	0.397	104	0	349	149	**1,456**
2000	227	0	638	0.79	98	0	393	166	**1,523**
2001	211	0	582	0.77	106	0	320	172	**1,392**
2002	188	0	538	1.15	99	0	296	181	**1,303**
2003	180	0	520	0.852	106	0	285	190	**1,282**
2004	210	0	488	0.75	93	0	283	133	**1,208**
2005	207	0	465	0.786	90	0	297	157	**1,217**
2006	202	0	466	2.281	82	0	379	122	**1,253**

For a selected alternative (Alternative E), unconstrained reasonable foreseeable development projection we estimate that during the 20-year planning cycle of 2011 to 2030, as many as 5,908 wells would be drilled in the HiLine planning area. Up to 144 of these wells could be coalbed

gas wells. Of the 5,764 remaining wells, 1,024 wells are projected to lie within the Bowdoin Dome Natural Gas Project Area (BNGPA). The estimated development potential and related drilling density (per township) of the projected new 5,908 wells is shown on Table 5.

Table 5: Total wells projected to be drilled within the HiLine Planning Area for the selected alternative (Alternative E) for the period 2011-2030. The projections of the percent of total future Federal wells drilled for this period is also presented in parentheses. (October 29, 2012)

	CBNG Wells (% Federal Wells)	Non-CBNG Wells Excluding BNGPA (% Federal Wells)	Non-CBNG Well BNGPA (% Federal Wells)	Total Wells
Alternative E	144 (12.50%)	4,740 (25.11%)	1,024 (54.69%)	5,908

Development potential is defined as high, moderate, low, and very low and it is related to the relative hydrocarbon prospectivity (occurrence potential) of the area. Areas of high prospectivity (high potential for the occurrence of hydrocarbons) will tend to be areas of high development potential. The converse is also true, in the areas of low prospectivity (low potential for the occurrence of hydrocarbons) will also tend to be areas of low development potential. High development potential indicates areas where we estimate average drilling density would be 110 well locations per township (one township is about 36 square miles) during 2011-2030. Moderate development potential indicates 60 wells per township; low development potential indicates 10 well locations per township; and very low development potential is defined as 0.5 wells per township.

Table 6: *Estimate of wells per acre from the amount of wells per township.*

Potential	Wells per Township	Acres per Township	Wells per Acre
High	110	23040	0.004774
Moderate	60	23040	0.002604
Low	10	23040	0.000434
Very Low	0.5	23040	0.000022

Of the 24 parcels being offered for sale 2 have very low development potential, 11 have low development potential, 9 have moderate development potential, and 2 have high development potential (Table 6). Table 6 provides an approximation of the amount of wells to be drilled on the offered parcels during 2011-2030. From this table it is estimated that a total of 11 (eleven) wells will be drilled on the 24 parcels that are being offered.

For the selected alternative, there will be an estimated total of 2.85 acres of short-term surface disturbance per well for coalbed and Bowdoin area, and 5.2 acres of short-term disturbance for the rest of the planning area. For long-term disturbance, the RMP estimated about 0.75 acres for coalbed and Bowdoin area, and 0.92 acre for the rest of the planning area (Volume III, p 1281).

This amounts to approximately 31.35 – 57.2 acres of short-term surface disturbance and between 8.25 – 10.12 acres of long-term surface disturbance on the offered parcels.

Table 7: Development potential of all offered parcels.

Parcel	County	Total Acres	Potential	Wells/Acre	Wells
MTM 108952-FC	Hill	120.0	Moderate	0.00260	0.3
MTM 108952-CU	Hill	7.3	High	0.00477	0.0
MTM 108952-BQ	Blaine	200.0	High	0.00477	1.0
MTM 108952-FB	Blaine	840.0	Low	0.00043	0.4
MTM 108952-E6	Blaine	160.0	Low	0.00043	0.1
MTM 108952-E7	Blaine	440.0	Moderate	0.00260	1.1
MTM 108952-E8	Blaine	560.0	Moderate	0.00260	1.5
MTM 108952-E9	Blaine	960.0	Moderate	0.00260	2.5
MTM 108952-FA	Blaine	400.0	Moderate	0.00260	1.0
MTM 79010-PX	Blaine	320.5	Low	0.00043	0.1
MTM 93096	Chouteau	240.0	Low	0.00043	0.1
MTM 108952-CR	Liberty	80.0	Low	0.00043	0.0
MTM 108952-CT	Liberty	40.0	Low	0.00043	0.0
MTM 79010-CI	Glacier	280.0	Low	0.00043	0.1
MTM 105431-HR	Valley	600.0	Very Low	0.00002	0.0
MTM 105431-HT	Valley	160.0	Very Low	0.00002	0.0
MTM 79010-A8	Phillips	200.4	Low	0.00043	0.1
MTM 79010-B4	Phillips	120.0	Low	0.00043	0.1
MTM 79010-A4	Phillips	40.0	Low	0.00043	0.0
MTM 79010-B3	Phillips	66.0	Low	0.00043	0.0
MTM 79010-B9	Phillips	360.1	Moderate	0.00260	0.9
MTM 79010-C1	Phillips	240.0	Moderate	0.00260	0.6
MTM 79010-HS	Phillips	447.7	Moderate	0.00260	1.2
MTM 79010-HQ	Phillips	9.8	Moderate	0.00260	0.0
Total		6891.8			11

Depending upon the location of the well (Bowdoin vs rest of planning area), each well would result in a range of 2.85 to 5.2 acres of short-term surface disturbance and 0.75 to 0.92 acres of long-term surface disturbance. For 11 wells, that equates to a range of 31.35 to 57.2 acres of short-term disturbance and 8.25 to 9.9 acres of long-term disturbance.

3.3 No Action Alternative - Impacts

Under the No Action Alternative, the proposed parcels would not be leased. There would be no new impacts from oil and gas exploration or production activities on the federal lease parcel

lands. No additional natural gas or crude oil would enter the public markets, and no royalties would accrue to the federal or state treasuries from the parcel lands. The No Action Alternative would result in the continuation of the current land and resource uses on the lease parcels, and would remain the same as the affected environment described in Chapter 3, as well as in the HiLine ARMP, with the exception of economics as noted below.

Under No Action, the BLM would not collect revenues from leasing the parcels, which would include the bonus bids paid at the competitive lease auction and annual rents collected on leased parcels not held by production. Since the BLM would not collect revenue, there would be no money dispersed to the State of Montana and affected counties (Blaine, Choteau, Glacier, Hill, Liberty, Phillips, and Valley). As noted in the Economic analysis in Section 3.18, the loss in revenue could be up to $10,338 in annual rent for the first five years, $13,784 for the second five years, and a one-time bonus bid revenue of $13,784, assuming one hundred percent of the proposed parcels are sold.

3.4 Direct, Indirect, and Cumulative Effects of the Proposed Action

The act of leasing parcels would not cause direct or cumulative effects to resources because no surface disturbance would occur. The only direct effects of leasing are the creation of valid existing rights and impacts related to revenue generated by the lease sale receipts.

Future lease exploration and development activities proposed through individual APD submission will be subject to future BLM decision-making and NEPA analysis. The BLM assumes there is a high interest in development of any leased parcels but, even if lease parcels are leased, it is uncertain whether development would actually occur. Therefore, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. This analysis assumes wells would be developed based upon information described in the Reasonable Future Development Scenario described in the Butte ARMP FEIS and in Section 3.2 above.

Upon receipt of an Application for a Permit to Drill (APD), the BLM would initiate a site-specific NEPA analysis that considers the direct, indirect, and cumulative effects of a specific action. At this time, detailed information about proposed wells and facilities would be provided for particular leases. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify APD Conditions of Approval (COAs), based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

Overall impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the HiLine FEIS (BLM,

2015). The lease parcels being analyzed in this EA have been designated open with appropriate stipulations.

3.5 Air Resources

Affected Environment

Air resources include air quality, air quality related values (AQRVs), and climate. As part of the planning and decision making process, BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on air resources. Air resource impacts are affected by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

Air Quality

Ambient air quality in a given location may be characterized by comparing the concentration of various pollutants in the ambient air with the standards set by federal and state agencies. Under the authority of the Clean Air Act (CAA), the EPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS) for six air pollutants. The standards set maximum allowable atmospheric concentration of these six criteria pollutants. The primary standards were established to protect the public health within an adequate margin of safety; the secondary standards were established to protect the public welfare from any known or anticipated adverse effects of a pollutant. Pollutants for which standards have been set include carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM10 and PM2.5), ozone (O3), sulfur dioxide (SO2), and lead.

Two additional pollutants of concern, nitrogen oxides (NOx) and volatile organic compounds (VOCs) are also regulated because they contribute to the formation of ozone in the atmosphere, however no NAAQS have been established for these pollutants. Additionally, greenhouse gases (GHGs) became regulated pollutants on January 2, 2011 because of their contribution to global climate change effects. Many air quality permitting and regulation activities are delegated to the Montana Department of Environmental Quality (MDEQ), which has also set state ambient air quality standards. MDEQ has also established permitting and registration requirements as well as emission standards for equipment involved in oil and gas development.

The EPA air quality index (AQI) is an index used for reporting daily air quality to the public (https://www.airnow.gov/). The AQI index is one way to generally evaluate how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates a daily AQI based on local air monitoring data. Air monitoring data and daily AQIs are available within or near the proposed areas for leasing in Lewis and Clark, Fergus, and Phillips counties. The following terms help interpret the AQI information:

- Good – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.

- Moderate – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- Unhealthy for Sensitive Groups – When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- Unhealthy – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- Very Unhealthy – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.
- Hazardous – The AQI is above 300. This level would trigger a health warning of emergency conditions. The entire population is more likely to be affected.

AQI data show air quality is good within the analysis area and that there is little risk to the general public from poor air quality (**Table 8**). Based on available data for the most recent 3 year period (2014-2016) for Lewis and Clark, Fergus, and Phillips counties, at least 82 percent of the days were rated "good" over the three year period.

Table 8: Air Quality Index Data 2014-2016

County	Days in Period	Days Rated Good	% Days Rated Good	Days Rated Moderate	Days Rated not healthy[1]
Lewis and Clark	1096	901	82%	170	25
Fergus	1096	1049	96%	37	10
Phillips	1092	1036	95%	47	9

[1] includes days rated unhealthy for sensitive groups, unhealthy, and very unhealthy
Source: EPA Air Data https://www.epa.gov/outdoor-air-quality-data (EPA 2016)

The area where the parcels for this lease sale are proposed, is in compliance with all NAAQS. Maximum concentrations as a percentage of the NAAQS are summarized in **Table 9** based on monitoring data available for 2014 through 2016. Data are not provided for CO and lead, which are not monitored within the analysis area and are typically not pollutants of concern associated with oil and gas leasing. Oil and gas development can result in emissions that can affect ambient concentrations of particulate matter, ozone, and nitrogen oxides from construction and production activities and in some fields, concentrations of sulfur dioxide can be affected. Hazardous air pollutants (HAPs) may also be emitted from oil and gas operations, including well drilling, well completion, and venting. However, no ambient standards have been established for HAPs associated with oil and gas development in this area and ambient monitoring data is not available.

Ozone concentrations above the NAAQS have been measured in Utah and Wyoming in areas with considerable oil and gas activity, however, only moderate ozone concentrations have been measured in Montana's oil and gas development areas. Based on 2014-2016 data from monitors located near Helena, Lewistown, and Malta, ozone concentrations are approximately 80 percent of the ozone NAAQS. Measured concentrations of NO_2, $PM_{2.5}$, and SO_2 are well below the NAAQS in the analysis area.

Table 9: Air Monitoring Values within the Analysis Area 2014 -2016

Pollutant	NAAQS	MAAQS	units	Averaging Time / Form	Station	Monitored Concentration	% of NAAQS/ MAAQS
O_3	0.07	N/A	ppm	8-hour 3 yr. ave. of 4th high daily max.	Helena	0.06	81%
					Lewistown	0.06	80%
					Malta	0.06	79%
NO_2	100	300	ppb	1-hour 3 yr. ave. of 98th %tile of daily max	Helena	--	--
					Lewistown	11.33	11%
					Malta	7.00	7%
	53	50	ppb	Annual annual mean	Helena	--	--
					Lewistown	3.20	6%
					Malta	1.76	4%
PM_{10}	150	150	ug/m^3	24 hour max. over 3 years	Helena	--	--
					Lewistown	104.00	69%
					Malta	177.00	118%
	N/A	50	ug/m^3	Annual 3 yr. ave. of annual mean	Helena	--	--
					Lewistown	8.60	17%
					Malta	9.43	19%
$PM_{2.5}$	35	N/A	ug/m^3	24 hour 3 yr. ave. of 98th percentile	Helena	23.27	66%
					Lewistown	23.17	66%
					Malta	23.10	66%
	12	N/A	ug/m^3	Annual 3 yr. ave. of annual mean	Helena	3.25	27%
					Lewistown	4.59	38%
					Malta	5.25	44%
SO_2	75	50	ppb	1-hour 3 yr. ave. of 99th percentile daily max.	Helena	1.77	2%
					Lewistown	--	--
					Malta	--	--

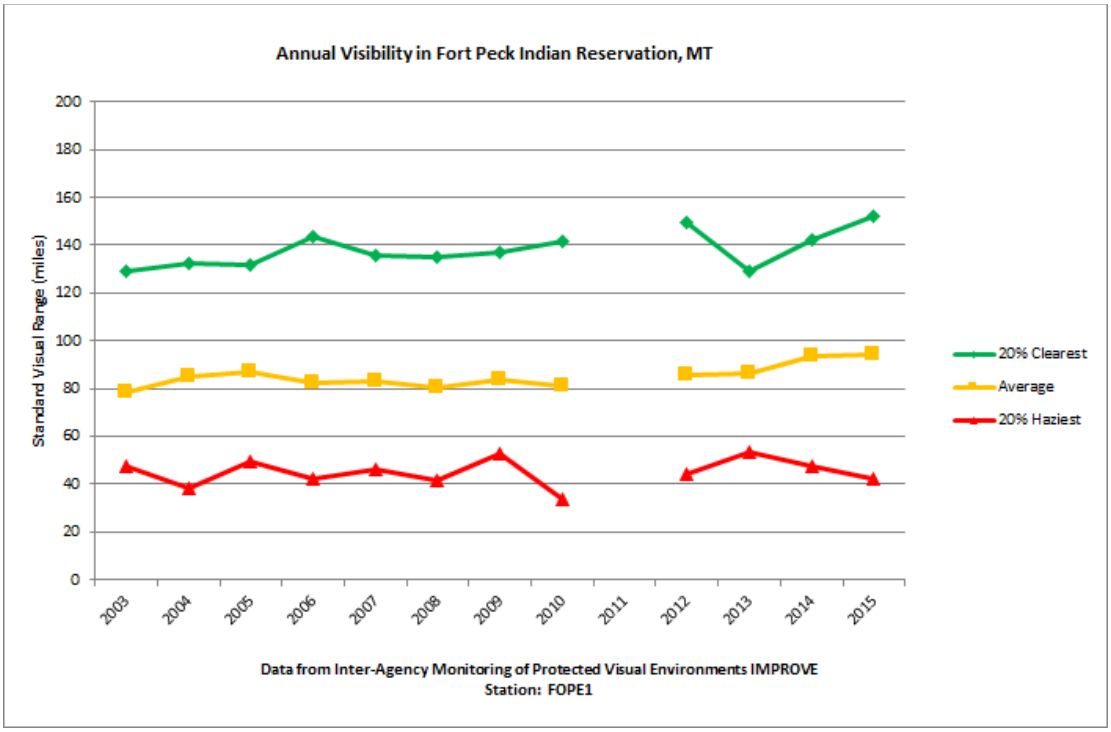
[a] Representative concentrations are based on data from the Seiben Flats monitoring station in Lewis and Clark County, Lewistown station in Fergus County, and Malta station in Phillips County.
Source: EPA Air Data https://www.epa.gov/outdoor-air-quality-data (EPA, 2016a)

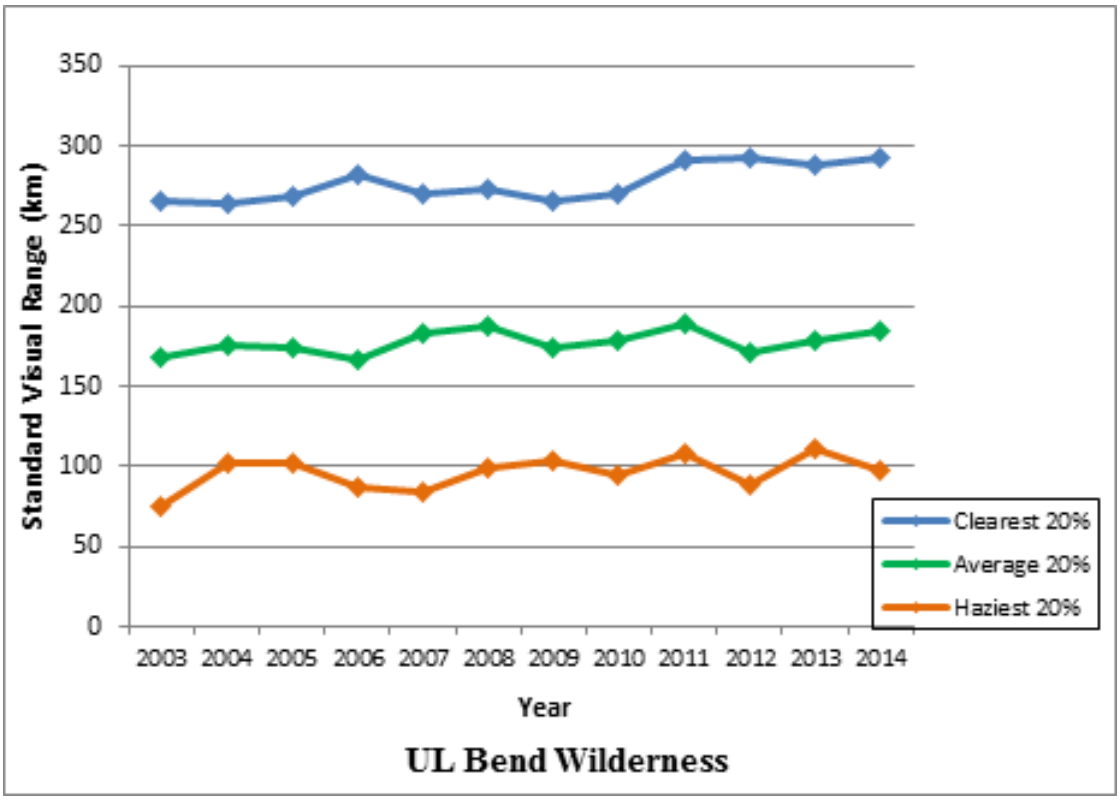
Air resources also include visibility, which can be assessed in terms of the distance that a person can distinguish a large dark object on the horizon and is measured as the standard visual range in miles. Because visibility at any one location is highly variable throughout the year, it is

characterized by three groupings: the clearest 20% days, average 20% days, and haziest 20% days. Visibility degradation is primarily due to anthropogenic sulfate, nitrate, and particulate emissions and due to wildfires. Air pollutants affecting visibility can be transported hundreds of miles.

Figure 1 illustrates visibility trends based on air monitoring data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. Monitoring data from two Class I areas near some of the proposed parcels is presented for the Fort Peck Indian Reservation and the UL Bend Wilderness Area (IMPROVE, 2017). Because visibility is highly variable throughout the year, it is characterized by three groupings: the clearest 20% days, average 20% days, and haziest 20% days. A slight improving trend in standard visual range is apparent on average and clearest days at the Fort Peck Indian Reservation, while improvement in the haziest days has remained static. Data are not available for 2011 for this station. At the UL Bend Wilderness, visual range was relatively stable for the average 20% days, with a slight improvement for the 20% haziest and 20% clearest days.

Figure 1: Visibility Trends in Nearby Class I Areas





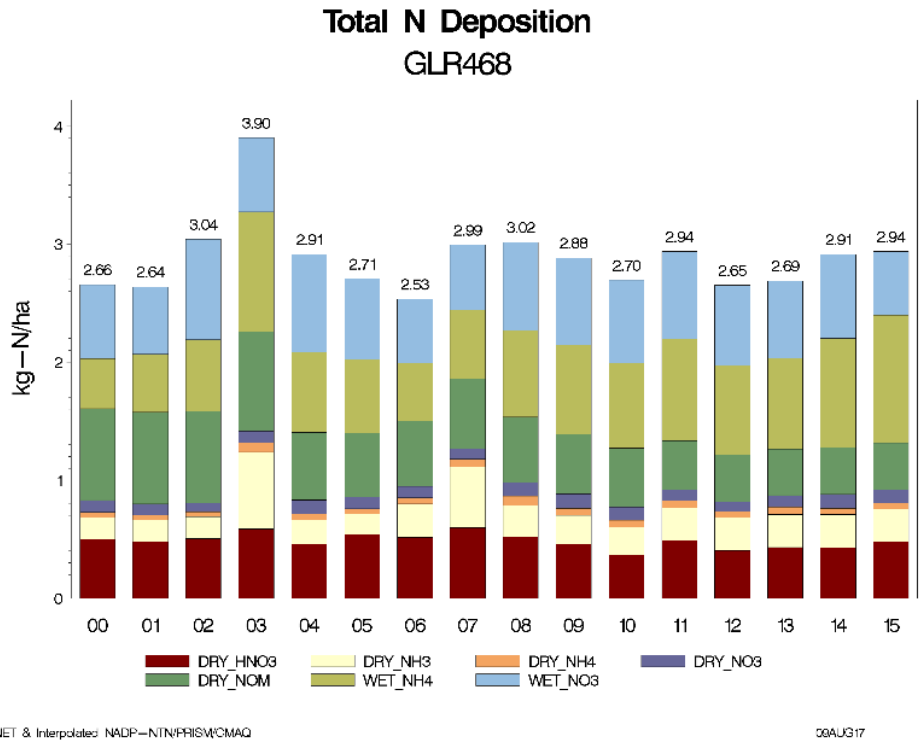
Atmospheric deposition occurs when gaseous and particulate air pollutants are deposited on the ground, water bodies or vegetation. The pollutants may settle as dust or be washed from the atmosphere in rain, fog, or snow. Deposition is the process by which pollutants are removed from the atmosphere via mechanical and chemical processes. When air pollutants such as sulfur and nitrogen are deposited into ecosystems, they may cause acidification, or enrichment of soils and surface waters. Atmospheric nitrogen and sulfur deposition may affect water chemistry, resulting in impacts to aquatic vegetation, invertebrate communities, amphibians, and fish. Deposition can also cause chemical changes in soils that alter soil microorganisms, plants, and trees. Although nitrogen is an essential plant nutrient, excess nitrogen from atmospheric deposition can stress ecosystems by favoring some plant species and inhibiting the growth of others.

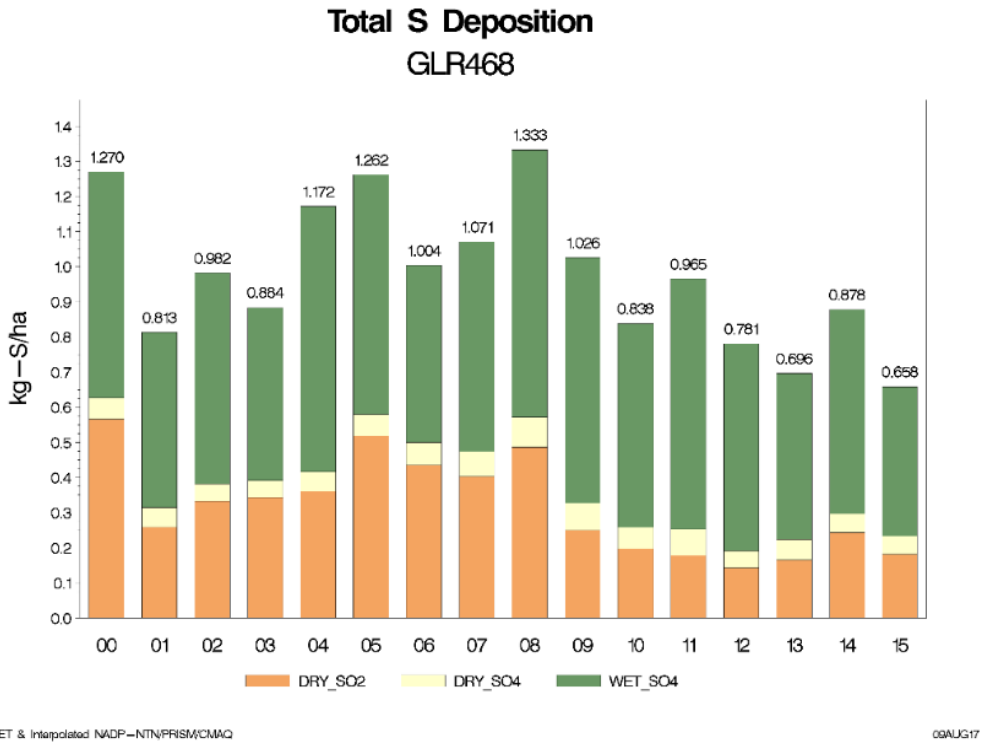
These processes are measured via two distinct methodologies, i.e. wet deposition and dry deposition monitors. The National Atmospheric Deposition Program (NADP) is a cooperative effort among many agencies and universities that uses various precipitation chemistry monitoring networks to measure wet deposition and study its effects on the environment.

The Clean Air Status and Trends Network (CASTNET) is a national monitoring network designed to measure dry atmospheric deposition, and to provide data to assess trends in air quality and ecological effects due to changes in air pollutant emissions. CASTNET provides long-term monitoring of air quality in rural areas to determine trends in regional atmospheric nitrogen, sulfur, and ozone concentrations and deposition fluxes of sulfur and nitrogen pollutants.

There are two deposition monitoring sites located within or near the analysis area for the proposed parcels. The monitoring site at Glacier National Park is a CASTNE site and includes both wet and dry deposition. The site in Havre, MT is an NADP wet deposition site. Data from the Glacier Nation Park site shows that a slight increase in total wet and dry nitrogen deposition over the period from 2000-2015 while total wet and dry sulfur deposition has decreased. Similar trend are evident in wet deposition data from the Havre site (NADP, 2017). Lake acidification is unlikely with these deposition values and has not been reported at lakes in the area.

Figure 2 Total Nitrogen and Sulfur Wet and Dry Deposition at Glacier national Park (2000-2015)





Glacier NP https://www3.epa.gov/castnet/site_pages/GLR468.html

Climate and Climate Change

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years such as temperature and precipitation. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC, 2013). Climate change and climate science are discussed in detail in the climate change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR, 2010) and in the HiLine Final EIS (BLM, 2015).

The IPCC states: "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC, 2013). The global average surface temperature has increased approximately 1.5°F from 1880 to 2012 (IPCC, 2013). Warming has

occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth).

In Montana, annual average temperatures have been steadily increasing between 1901 and 2016 from 41.8°F to 44.6°F statewide. Statewide precipitation has varied only slightly from the mean of 18.62 inches during that timeframe but regional precipitation has become wetter in some areas and drier in others (NOAA, 2017). **Table 10** annual changes in temperature and precipitation per decade in several regions in the state.

Table 10**: **Annual Climate Trends in Montana (1901-2015)

Region	**Annual Mean Temperature Change (°F/decade)**	**Precipitation Change (inches/decade)**
Western MT	+0.2	-0.05
North Central MT	+0.3	-0.04
South Central MT	+0.2	+0.07
Northeastern MT	+0.3	+0.08
Southeastern MT	+0.2	+0.09

***Source:** NOAA National Centers for Environmental Information, https://www.ncdc.noaa.gov/cag/*

Earth's atmosphere has a natural greenhouse effect wherein naturally occurring gases such as water vapor, carbon dioxide (CO2), methane (CH_4), and nitrous oxide (N2O) absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR, 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere. The buildup of GHGs such as CO2, CH_4, N2O, and other less common gases since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO2 and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR, 2010).

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the climate change SIR describes impacts of climate change in detail at various scales, including the state scale when appropriate. The EPA identifies eastern Montana as part of the Great Plains region. The following summary characterizes potential changes

identified by the EPA (USEPA, 2016) that are expected to occur at the regional scale, where the Proposed Action would occur.

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions would reduce the range and health of ponderosa and lodge pole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife such as the mountain lion, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR. Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (USGCRP, 2009, as cited by Climate Change SIR, 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff would increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increased insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

More specific to Montana, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (2010) include:

- Temperature increases in Montana are predicted to be between 3 to 5°F at the mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- Precipitation increases in winter and spring in Montana may be up to 25 percent in some areas. Precipitation decreases of up to 20 percent may occur during summer, with potential increases or decreases in the fall.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Water temperatures are expected to increase in lakes, reservoirs, rivers, and streams. Fish populations are expected to decline due to warmer temperatures, which could also lead to more fishing closures.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in Montana based on a 1°C global average temperature increase to be 241 to 515 percent.

While long-range regional changes might occur within this analysis area, it is not possible to predict precisely when they could occur.

Environmental Consequences

The direct, indirect, and cumulative impacts from oil and gas development on air resources are analyzed in Chapter 4 of the HiLine RMP and Final EIS (BLM, 2015) and are incorporated by reference into this EA. The RFD for this alternative, Chapter 3.2, would be in conformance with the emission impacts described in the referenced document. This analysis included discussion of short term and long term impacts. Application of CSU 12-23 and LN 14-18 would provide for conservation of air resources.

Leasing the subject parcels would have no direct impacts on air quality. Any potential effects on air quality would occur if and when the leases are developed for oil and gas activities. The following paragraphs discuss the type of air emissions that could be expected from future oil and gas development as a result of the proposed lease sale including quantified estimates of potential downstream emissions of greenhouse gases (GHG) emissions and the possible relationship to climate change.

It is important to note that at the leasing stage, there is a degree of speculation and uncertainty with regard to the amount of air pollutant emissions (including GHGs) that could occur since specific design details are not yet known. Therefore, the BLM may conduct additional analysis for air quality at the APD stage if development is proposed in the future. The type of petroleum product, depth of geologic play, drilling and completion methodology, equipment and vehicle make, model, engine size, project acreage, and construction plans are among several variables required to generate meaningful emissions estimates. These factors determine the intensity, duration, and characteristics of associated pollutants. Specifically, information needed to

reasonably and more accurately quantify emissions associated with well exploration and production activities include:

- The number, type, and duration of equipment needed to construct/reclaim, drill and complete (e.g., scrapers, drill rigs, completions, supply trucks, compressor, and production facilities);
- The technologies which may be employed by a given company for drilling any new wells to reduce emissions (e.g. Selective Catalytic Reduction [SCR] on diesel powered drill rigs, natural gas fired drill rig engines, the use of "green" completion technology, and multi-stage flare stacks);
- Area of disturbance for each type of activity (e.g. roads, pads, pipelines, electrical lines, and compressor station);
- Compression per well (sales and field booster), or average horsepower for each type of compressor, if needed;
- Onsite gas and liquids treatment and storage equipment; and
- The number and type of facilities utilized for production operations.

These sources have the potential to release air pollutant emissions that contribute to ozone formation or contribute to increased global concentration of GHGs. Air pollutants such as VOCs and HAPs may be emitted from venting, flaring, and equipment leaks. Combustion of fuels in vehicles, generators, engines, and compressors may release CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs and GHGs. Potential emissions of these pollutants from the exploration, development, and onsite production phases associated with the RFD for these parcels have been addressed in the HiLine RMP Final EIS (BLM, 2015). The direct, indirect, and cumulative impacts from oil and gas development on air resources were analyzed in Chapter 4 of the HiLine Proposed Resource Management Plan and Final Environmental Impact Statement, June 2015. Additional detailed information on estimated air pollutant emissions (including GHGs) can be found in the Air Resource Technical Support Document for Emission Inventories, Near-Field Modeling, and Visibility Screening, October 2014 (BLM ARTSD, 2014). The air resources analysis includes a discussion of short term and long term impacts to air quality from reasonably foreseeable oil and gas development.

The HiLine RMP Final EIS (BLM, 2015) includes Appendix B Adaptive Management Strategy for Oil and Gas Resources, which identifies strategies for assessing and mitigating potential impacts to air quality from oil and gas development. Specific measures from this appendix would apply to the proposed parcels in this leasing action for the protection of air resources:

- The application of CSU 12-23 which requires drill rig engines greater than 200 horsepower to comply with Tier IV emission standards for non-road diesel engines,
- The application LN 14-18 notifying leaseholders that additional air quality analysis may be required at the discretion of the BLM,
- Additional Oil and Gas Best Management Practices included in Appendix H of the HiLine Approved Resource Management Plan, September 2015.

On January 2, 2011, the EPA began regulating GHG emissions under the Clean Air Act from mobile and stationary sources of air pollution because of their contribution to global climate

change. While the leasing action itself would not generate any direct or indirect GHG emissions, the BLM recognizes that the reasonably foreseeable consequence of leasing may be oil and gas development, and that such development could result in an increase in GHG emissions due to the post production or "downstream" uses of the petroleum products produced from these parcels. For this EA, the BLM used readily available scientific information and reasonable assumptions about product end use to estimate potential downstream emissions attributable to this lease sale. It should be noted at the outset that the BLM does not exercise control over the specific end use of the oil and gas produced from any individual federal lease and has no authority to direct or regulate the end use of the produced products. As a result, the BLM can only provide an estimate of potential GHG emissions by assuming that all produced products would eventually be combusted. The uncertainty about end uses is in addition to the uncertainty with regard to the actual levels of development and production that may occur at any given well.

Table 11 shows an estimate of potential downstream GHG emissions using reasonable projections and assumptions. In this analysis it was assumed that 100% of oil and gas produced from the parcels included in this proposed lease sale would be attributed to fossil fuel combustion within the United States for residential heating and electricity. Average oil and gas production rates for each county were obtained from the Reasonable Foreseeable Development Scenario developed for the HiLine RMP and corroborated with Montana Department of Natural Resources and Conservation (DNRC) – Montana Board of Oil and Gas Conservation (MBOGC) production data.

The total projected increase in downstream GHG emissions is estimated to be 0.0073 million metric tons (MMT) per year of carbon dioxide equivalents (CO2eq) if the lease parcels were sold and if they are developed and if the number of wells projected in the RFD produce oil and gas at a production rate similar to other wells in the associated fields. And lastly, the estimated downstream GHG emissions increase is based on 100% of the estimated production being combusted for residential use. According to the USEPA, this estimated quantity represents approximately 0.0002% of total U.S. GHG emissions reported in 2015 and 0.03% of Montana GHG emissions reported in 2015, and this quantity represents approximately 0.05% of the reported GHG emissions from coal fired power plants in Rosebud county (https://ghgdata.epa.gov/ghgp/main.do). The estimated quantity of GHG emissions from the combustion of fossil fuels that could be produced from the proposed lease sale parcels is approximately equivalent to the GHG emissions from 1,547 cars or the CO2 emissions from the energy used in 773 homes (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator). At this time, the BLM is disclosing the likelihood and potential magnitude of downstream GHG emissions but is not able to disclose potential impacts to climate change from the estimated downstream GHG emissions related to the proposed lease sale. Analysis of impacts at this stage would be speculative and would be not be based "reasonable projections and assumptions".

Table 11: Estimated Downstream GHG Emissions Due to Fossil Fuel Combustion

County	# of wells estimated for Mar. 2018 Leasing EA		Ave oil prod. Rate (BBL/day/ well)	Ave. gas prod. Rate (MCF/day/ well)	CO_2 Combustion emission factor (g/MMBTU)	CH_4 Combustion emission factor (g/MMBTU)	N_2O Combustion emission factor (g/MMBTU)	CO_2 Emissions (metric tons)	CH_4 Emissions (metric tons)	N_2O Emissions (metric tons)	CO_2eq Million Metric Tons/Year (MMTY)
	oil	gas									
Glacier	1	0	20	-	74,000	10	0.6	3,133	0.42	0.03	0.0032
Blaine	0	3	0	21	53,060	1	0.1	1,250.62	0.024	0.002	0.001
Hill	0	3	0	21	53,060	1	0.1	1,250.62	0.024	0.002	0.001
Phillips	0	4	0	21	53,060	1	0.1	1,667.49	0.031	0.003	0.002
											0.0073

References: https://www.eia.gov/oiaf/1605/coefficients.html#tbl3 , https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s03.pdf

3.6 Soil Resources

Affected Environment

Soils were identified from the Natural Resources Conservation Service's (NRCS) Web Soil Survey (WSS) website (2017) (http://websoilsurvey.nrcs.usda.gov/app/). Soil surveys were performed by the NRCS according to National Cooperative Soil Survey standards. Soils within the lease parcels developed from glacial till; residuum weathered from sandstone, siltstone, and shale; and, alluvium from mixed sources. Landforms consist of nearly level to steep dissected glacial till plains and hillslopes; and, nearly level to gently sloping alluvial fans, terraces, floodplains, and depressions. There are areas of barren or nearly barren land dissected by many drainage channels. Within these areas there is exposure of sedimentary bedrock. Soil patterns are complex and physical and chemical properties can vary within short distances (less than 5 feet) resulting in ecological site variability on the landscape. Many of the soils have accumulated salt and/or sodium from the parent materials. Moderately to strongly saline and/or sodic soil conditions limit reclamation potential.

Appendix D provides the Soil Map Units within each lease parcel and provides acres and soil ratings. Sensitive soils are included. Sensitive soils have severe water and/or wind erosion hazard rating as determined using a combination of slope and soil erodibility. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim (poorly suited for reclamation) to standards. Detailed Soil Map Unit descriptions are available from the WSS.

Liberty, Hill, and Chouteau and Glacier County Soils

Soils generally developed from Late Wisconsin loamy glacial till; residuum weathered from Kevin Member shale and Judith River Formation sandstone, siltstone and shale; Quaternary alluvium; and, Holocene lake clay, silt, sand, and gravel deposits (Fullerton et al., 2012b, c). Surface textures are predominately clay loam, but range from loam to silty clay loam. Soils can contain high amounts of accumulated salts and/or sodium. Slopes commonly range from 4 to 20 percent, but can be as steep as 60 percent. Sensitive soils occur within the lease parcels (see **Appendix D**).

Blaine, Phillips and Valley County Soils

Soils generally developed from Illinoian loamy or sandy glacial till; Late Wisconsin loamy glacial till; residuum weathered from Claggett and Bearpaw shale and Judith River Formation; glacial fluvial deposits; and, alluvium of modern (Holocene) channels and floodplains (Fullerton et al., 2012a,b). Landforms commonly consist of nearly level to steep (1 to 35 percent slope) ground and stagnation moraine and alluvial fans and terraces. There are areas of steep hillslopes and escarpments, with shallow soils, where slopes can be up to 60 percent. Surface textures are predominantly loam, but range from sandy clay loam to clay loam. Sensitive soils occur within the lease parcels (see **Appendix D**).

Environmental Consequences

Offering 24 parcels for lease would have no direct impacts on soil resources. Any potential effects from the sale of leases could occur at the time the leases are developed at the APD stage. Potential site-specific effects would be addressed in more detail at the APD stage. The direct, indirect, and cumulative impacts from fluid mineral development on soil resources are discussed in Chapter 4 of the HiLine Final EIS (USDI–BLM, 2015a) and are incorporated by reference into this EA.

Construction and operation of well pads, access roads, pipelines, power lines, reserve pits, and other facilities would result in the exposure of mineral soil, soil compaction and rutting, mixing of soil horizons, loss of soil productivity, and increased susceptibility to wind and water erosion. The likelihood and magnitude of these occurrences are dependent upon local site characteristics, climatic events, and the specific mitigation applied. Effects would be both short-term (well pads and pipelines) and long-term (production areas and access roads). Areas needed for production, access roads, and facilities would require a long-term commitment of the soil resource. These sites remain non-productive and continue to be at risk of erosion and compacted until abandonment and final reclamation. There is the potential for 11 wells to be drilled. This would result in up to 57 acres of short-term soil disturbances and 10 acres of long-term disturbances. Generally sites would be revegetated and erosion would return to natural rates within 5 years. Exceptions would be sites with sensitive soils. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim.

Lease parcels containing sensitive soils would have the CSU 12-62 stipulation attached (see **Appendix D**). This stipulation would provide protections to maintain the chemical, physical, and biotic properties of soils. Also, the stipulation would prevent excessive soil erosion and avoid disturbing areas subject to potential reclamation failure. **Appendix D** identifies the sensitive soils (severe water and/or wind erosion hazard) within each lease parcel with acreage.

Additional mitigation measures and/or BMPs, if necessary, would be applied once a site-specific plan of development is proposed. Measures would be consistent with those found in the Gold Book (USDI-BLM, 2007), Appendix N: Oil and Gas Best Management Practices (USDI-BLM, 2015b), and Appendix M: Reclamation (USDI-BLM, 2015b).

3.7 Water Resources

Affected Environment

Water in the lease area is owned by the state of Montana. The right to use surface and groundwater is administered by the Department of Natural Resources and Conservation (DNRC). The water quality standards of Montana support other Federal laws such as the Clean Water Act of 1977, the Water Resources Planning Act of 1962, the Pollution Prevention Act of 1990, and the Safe Drinking Water Act of 1977 and are administered by the Montana Department of Environmental Quality (MDEQ).

Surface Water

Watersheds are defined by a hydrologic unit code (HUC) and consists of a two-digit sequence for each specific level within the delineation hierarchy. The lease parcels are located in the larger Missouri-Marias (HUC 1003) and Milk (HUC 1005) subregions which contain unique and complex hydrologic systems of stream, prairie wetland, and lake features that vary in hydrologic permanence. Water resources in the area are essential to the residents for agriculture, public water supplies, industry, and recreation. Additionally, water resources and the corresponding riparian-wetland areas are crucial to the survival of fish and wildlife, potentially including BLM-sensitive fish, reptiles, birds, and amphibians.

According to the National Hydrography Dataset (NHD V.210) the parcels contain approximately 1.4 miles of perennial stream and 43 miles of ephemeral/intermittent stream **(Table 12).**

Although available since 1987, the Federal Emergency Management Agency (FEMA) flood maps have not been prepared to determine the acreage defined within the 100-year floodplain demarcation. Therefore, the extent (in acres) of defined 100-year floodplains occurring on BLM lands within the parcels is unknown. However, the Montana Natural Heritage Program Wetland mapping (MNHP 2016) identifies wetlands, and many of these include floodplain areas. According the NHP mapping, the parcels contain approximately 320 acres of waterbodies and wetlands **(Table 12).**

Streamflow in the area varies seasonally, with the largest flows commonly occurring in the spring or early summer. Water quality is often indirectly tied to streamflow as it is largely dependent on the relative contributions of runoff and groundwater. Metals are the number one cause of water quality degradation in the region, followed by nutrients, stream alteration, and sediment (Montana 303(d)/305(b) Integrated Report, 2016). Approximately 2.1 miles of stream within five of the parcels contain stream segments where one or more applicable beneficial uses have been assessed as being impaired or threatened (MTM 108952-FC, MTM 108952-CU, MTM 93096, MTM 79010-HQ, MTM 79010-HS) and may require additional mitigation prior to any development in order to avoid further impairment.

As with the streams, water quality is highly dependent on the relative contributions of runoff and groundwater. Eighteen parcels contain a variety of wetland types (MNHP, 2016). Some are shallow, highly dependent on annual precipitation, and frequently dry out by late summer. Others have sufficient storage capacity to hold water year-round, unless there is a prolonged drought.

None of the parcels contain areas classified as a source water protection (Montana Department of Environmental Quality, 2016).

Table 12: Mapped hydrologic features located in the lease parcels

Parcel	Watershed (HUC 8)	Perennial Stream (mi)	Intermittent/ Ephemeral Stream (mi)	Impaired Stream (mi)	Waterbody/ Wetlands (acres)	Probability of Development
MTM 108952-CU	Lodge	---	---	0.02	---	High
MTM 108952-BQ	Fort Peck Reservoir	---	1.5	---	1.9	High

Parcel	Watershed (HUC 8)	Perennial Stream (mi)	Intermittent/ Ephemeral Stream (mi)	Impaired Stream (mi)	Waterbody/ Wetlands (acres)	Probability of Development
MTM 108952-FC	Upper/Middle Milk	---	0.2	0.04	---	Moderate
MTM 108952-E7	Middle Milk	---	4.7	---	5.2	Moderate
MTM 108952-E8	Middle Milk	---	6.8	---	2.6	Moderate
MTM 108952-E9	Middle Milk	---	4.4	---	19	Moderate
MTM 108952-FA	Middle Milk	---	3	---	37.5	Moderate
MTM 79010-B9	Middle Milk/Whitewater	0.2	2.2	---	20.4	Moderate
MTM 79010-C1	Middle Milk	1	1.3	---	23.2	Moderate
MTM 79010-HQ	Middle Milk	---	0.4	0.4	22	Moderate
MTM 79010-HS	Middle Milk	---	1.3	1.5	75	Moderate
MTM 108952-FB	Middle Milk	---	3	---	29.2	Low
MTM 108952-E6	Middle Milk	---	0.8	---	5.7	Low
MTM 79010-PX	Middle Milk	---	0.7	---	11.7	Low
MTM 93096	Marias	0.2	0.7	0.2	---	Low
MTM 108952-CR	Marias	---	0.02	---	---	Low
MTM 108952-CT	Marias	---	0.3	---	---	Low
MTM 79010-CI	Cut Bank	---	0.7	---	---	Low
MTM 79010-B3	Middle Milk	---	0.6	---	2.6	Low
MTM 79010-B4	Middle Milk	---	0.5	---	29.6	Low
MTM 79010-A4	Middle Milk	---	---	---	10.6	Low
MTM 79010-A8	Middle Milk	---	1.9	---	18.4	Low
MTM 105431-HR	Rock	---	7.8	---	6.9	Very low
MTM 105431-HT	Rock	---	0.8	---	0.6	Very Low

Groundwater

Groundwater availability is determined in a large part by the unconsolidated deposits and different rock types that compose the diverse geology of the area. The majority of groundwater wells adjacent to the lease parcels are less than 300 feet deep as estimated from well logs (Montana Bureau of Mines and Geology) and occurs in unconsolidated materials (alluvium, glacial outwash, or terrace deposits) and in consolidated rocks such as sandstones, shaley sandstones, coal, limestone, or igneous rocks. Shallow groundwater, where present, can be found in alluvial deposits along the larger stream valleys and in buried pre-glacial alluvial channels. Aquifers are occasionally present at the contact between terrace gravel deposits and the underlying Bearpaw shale. These aquifers usually appear as low yield springs and seeps (less

than 2 gpm) on hillsides above drainages. The Judith River formation provides both artesian and static flow around 3-4 gpm.
The quality of water in aquifers underlying the region varies significantly and influences the types of beneficial uses that are possible from the various water sources. Water discharging from the contact springs is generally suitable for livestock, but not for domestic use. Concentrations of dissolved solids are typically greatest in aquifers formed in alluvial and glacial deposits, and the Judith River Formation.

According to the Montana Ground Water Information Center database (2015), there are eleven known wells within 1000 feet of the proposed parcels. These parcels are MTM 108952-CR, MTM 108952-FC, MTM 108952-CU, MTM 79010-B4, MTM 79010-A8, MTM 79010-C1, and MTM 79010-B9.

Wetlands and Riparian Areas

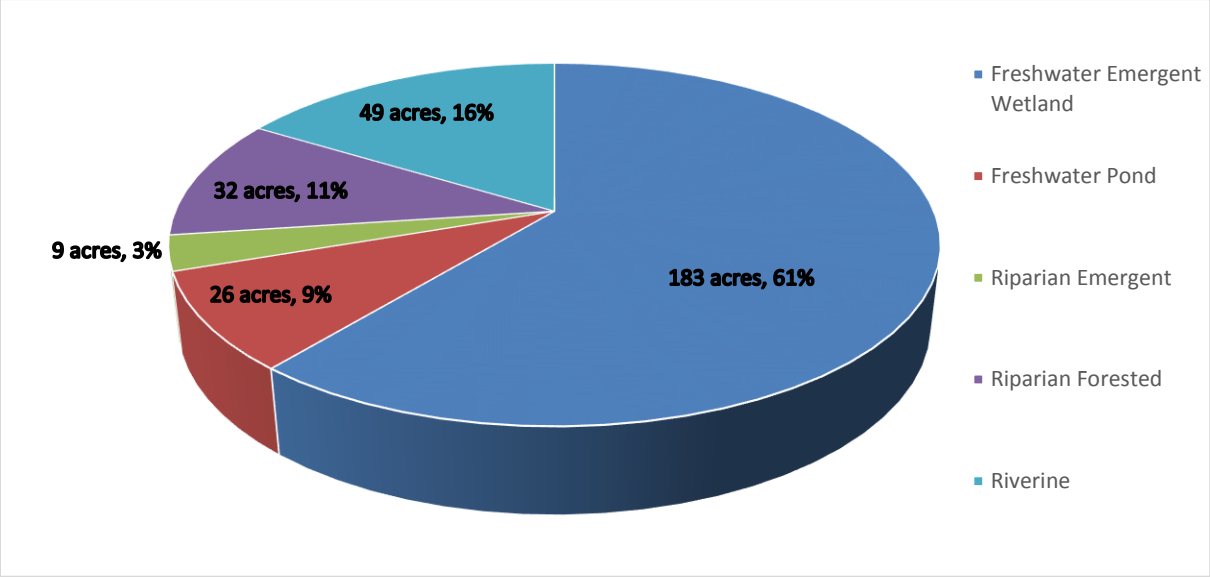
Riparian and wetland areas are among the most productive and important ecosystems, comprising approximately one percent of all national public lands. Riparian areas may be associated with lakes, reservoirs, potholes, springs, wet meadows, and ephemeral, intermittent, or perennial streams.

Characteristically, riparian and wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Because of the high productivity of riparian areas, they are very important resources for wildlife and livestock.

Vegetative species common to riparian areas vary widely from site to site. Common species in riparian areas are listed in Riparian Dominance Types of Montana (Hansen, et.al. 1988). Some of the more common vegetative species that occur in these areas include: prairie cordgrass, switchgrass, Canada wildrye, western wheatgrass, sedges (*Carex spp.),* rushes (*Juncus spp.*), willow, chokecherry, buffaloberry, snowberry, box elder, and plains cottonwood. The higher terraces adjacent to the floodplains are often dominated by silver sage or greasewood with a grass understory.

Healthy riparian-wetland systems reduce flooding, filter and purify water as it moves through the riparian-wetland zone, reduce sediment loads and enhance soil stability, provide micro-climate moderation when contrasted to temperature extremes in adjacent areas, and contribute to ground water recharge and base flow (USDI, BLM, 1987b). Based on the Montana Natural Heritage Program Wetland mapping (MNHP 2016), there are approximately 300 acres of mapped riparian-wetland habitat inside the lease parcel boundaries **(Table 12)**. Freshwater emergent wetlands are the dominant feature, but riverine, forested riparian, riparian emergent, and freshwater ponds are also present (**Figure 3**).

Figure 3: Relative distribution of riparian-wetland types located in the lease parcels (Montana National Heritage Program, 2016)



Environmental Consequences

Surface Water and Groundwater Effects

Offering twenty-four parcels for lease would have no direct impacts on water resources because no surface or subsurface disturbance would occur. Any potential effects to water resources would occur from subsequent exploration/development of the lease parcels, which would be subject to additional review and site specific conditions of approval (COAs). The probability of this occurring is disclosed in Table 6 of this EA and in the HiLine RMP (page 450-453).

Potential indirect and cumulative impacts from oil and gas development on water resources are discussed in the HiLine RMP and FEIS (pages 692 – 716), but summarized below. The magnitude of these impacts would depend on variables such as the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. The potential for these effects would be analyzed in detail at the time of a receipt of an Application for a Permit to Drill. If future development occurs, site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored in order to minimize effects to water resources.

The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM and USFS 2007) would be followed. Guidance in the hydraulic fracturing rule published as final on March 26, 2015 (80 Fed. Reg. 16128) would also be applied, as appropriate. The Montana Board of Oil and Gas Conservation (MBOGC) has primary regulatory jurisdiction over the Underground Injection Control (UIC) Program for Class II injection or disposal wells and will work with all relevant parties to protect underground sources of drinking water.

Based on the RFD scenario of 11 wells across the 24 parcels, it is estimated that only 31-57 acres of short-term surface disturbance would occur and 8 to 10 acres of long-term surface disturbance (See Chapter 3.2). Future exploration and development of a lease parcel could impact surface water resources by causing the removal of vegetation, soil compaction, and soil disturbance. The potential effects from these activities are accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants (MDEQ 2007).

Spills or produced fluids could potentially impact surface and ground water resources in the long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids, fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal could result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. Typically, produced water from conventional oil and gas wells is from a depth below useable aquifers or coal seams (FSEIS 2008).

Though the proposed action has no direct impact; stipulations regarding steep slopes, erosive soils, and activities on floodplains and in riparian-wetland areas would minimize potential future impacts and are applied to the initial lease of the parcels (Appendix A). Stipulation CSU 12-25 restricts surface occupancy and use within 300 feet of riparian and/or wetland areas until an approved plan is in place that addresses: potential impacts to riparian and wetland resources; mitigation to reduce any impacts to acceptable levels; post-project restoration; and monitoring capable of detecting early signs of changing riparian and/or wetland conditions. Stipulation NSO 11-70 prohibits surface occupancy and use within perennial or intermittent streams, lakes, ponds, reservoirs, 100-year floodplains, wetlands, and riparian areas. Standard 16-3 likewise minimizes effects by initiating erosion control and limited surface use stipulations. These stipulations, when combined with site specific Conditions of Approval (COAs), will mitigate potential effects to water resources from any future development.

Wetlands and Riparian Areas

Leasing the parcels would have no direct impacts on riparian-wetland habitats. Stipulations addressing sensitive soils as well as prohibiting surface occupancy on waterbodies, streams, floodplains, and riparian-wetland areas would minimize potential impacts and be included with all leases that contain the aforementioned features (Appendix A). Any site-specific potential effect to the riparian-wetland resource would occur at the time of exploration and production. These effects would be analyzed at the time of a receipt of an Application for a Permit to Drill. The potential direct, indirect, and cumulative impacts from oil and gas development on riparian-wetland resources are discussed in the HiLine RMP and FEIS (pages 662-678).

The potential future exploration and development of oil and gas within uplands, adjacent to riparian-wetland areas, or stream crossings could reduce riparian/wetland functionality by changing native plant productivity, composition, richness, and diversity; accelerating erosion; increasing sedimentation; and changing hydrologic characteristics. Impacts that reduce the functioning condition of riparian and wetland areas could impair the ability of riparian/wetland

areas to reduce nonpoint source pollution (MDEQ 2007) and provide other ecosystem benefits. The magnitude of these effects would be dependent on the specific activity, season, proximity to riparian-wetland areas, location in the watershed, upland and riparian-wetland vegetation condition, mitigation applied, and the time until reclamation success. Erosion increases typically are localized, short term, and occur from implementation through vegetation removal. As acres of surface-disturbance increase within a watershed, so would the potential for effects to riparian-wetland resources. Based on the RFD scenario of 11 wells across the 24 parcels, it is estimated that only 31-57 acres of short-term surface disturbance would occur and 8 to 10 acres of long-term surface disturbance (See Chapter 3.2).

Though the proposed action has no direct impact; stipulations for controlled surface use within 300 feet of wetlands/riparian areas and no surface occupancy would minimize potential future impacts and are applied to the initial lease of the parcels (Appendix A). Stipulation CSU 12-25 restricts surface occupancy and use within 300 feet of riparian and/or wetland areas until an approved plan is in place that addresses: potential impacts to riparian and wetland resources; mitigation to reduce any impacts to acceptable levels; post-project restoration; and monitoring capable of detecting early signs of changing riparian and/or wetland conditions. Stipulation NSO 11-70 prohibits surface occupancy and use within wetlands, and riparian areas. Standard 16-3 likewise minimizes effects by initiating erosion control and limited surface use stipulations. These stipulations, when combined with site specific Conditions of Approval (COAs), would mitigate potential effects to riparian-wetland areas prior to land disturbance. Additional mitigation measures would be applied at the APD stage that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction & runoff, maintain vegetative cover, control nonnative species, maintain biodiversity, maintain vegetated buffer zones, and expedite rapid reclamation (including interim reclamation) would maintain riparian/wetland resource conditions.

3.5 Upland Vegetation

Affected Environment

Upland Vegetation Communities

The vegetation within the project area is characteristic of the Northern Glaciated Plains in the 10-14 inch precipitation zone. Vegetation is comprised of tall, mid, and short grasses as well as both warm and cool season grasses. A variety of grass-like plants, forbs, shrubs and trees also add to the vegetative diversity of this rangeland type. Plant species diversity increases in woody draws and riparian/wetland zones.

Existing influences on local distribution of plant communities include soils, topography, and surface disturbance, availability of water, management boundary fence lines, and soil salinity. Vegetation communities have been affected by human activities for over a century. Some of these activities include: infrastructure developments (roads, power lines, pipelines, etc.), chemical applications, livestock grazing, farming, and wildfire rehabilitation, prevention, manipulation, and suppression.

Five vegetation communities have been identified within the analysis area: native mixed grass prairie, sagebrush/mixed grasslands, cultivated-agricultural lands, improved or restored pastures, and riparian-wetlands. There are numerous ecological sites identified within the analysis area, but the primary ones include the following; Claypan (Cy), Sandy (Sy), Sandy-Steep (SyStp), Shallow (Sw), Shallow Clay (SwC), Silty (Si), and Silty- Steep (SiStp). The total dry-weight production expected to be found on these sites during a normal growing season ranges from approximately 800 to 1,500 lbs. /acre.

The **native mixed grassland community** is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses. These perennial grasses can also be classified as tall, mid, and short grasses. Some of the more common grasses include western wheatgrass (Pascopyrum smithii), needle-and-thread (Hesperostipa comata), green needlegrass (Nassella viridula), blue grama (Bouteloua gracilis), and prairie junegrass (Koeleria macrantha). Various forbs and shrubs are present but, occur as a minor species composition component throughout the community. This community type is represents approximately 76% of the proposed lease parcel acreage.

The **shrub/mixed grassland community** occurs on lower valley slopes near drainages, especially where soils are deeper. This community can include individuals or a combination of silver sagebrush (Artemisia cana), Wyoming big sagebrush (Artemisia tridentata ssp. wyomingensis), greasewood (Sarcobatus vermiculatus), Gardner's saltbush (Atriplex gardneri). The shrub/mixed grassland vegetation community has a perennial grass and forb understory, similar to the species found in a mixed native grassland community. The expected species composition on this community consists of 70-75% native grass species, 10-15% forbs, and 5-10% shrubs and halfshrubs. This community type represents approximately 6% of the proposed lease parcel acreage.

Improved or restored pastures consist of areas planted with introduced grasses, predominately crested wheatgrass (Agropyron cristatum), specifically for the improved vegetation production for livestock consumption. These areas typically fail to meet the biodiversity Standard of Rangeland Health due to lack of vegetative diversity. However, these areas do provide other resource values such as forage for livestock and wildlife as well as habitat for some species of wildlife. This community type is represents approximately 12% of the proposed lease parcel acreage.

The **cultivated plant community** is comprised of monocultures of crops which may include small grains, alfalfa, or other crops grown primarily for harvesting purposes. These areas have been completely disturbed from the native vegetation potentials. This community type is represents approximately 6% of the proposed lease parcel acreage.

Livestock Grazing

There are 18 parcels proposed for leasing which are located within the boundaries of 21 BLM grazing allotments. Some parcels are located both inside and outside of BLM grazing allotments. The administrative boundaries of BLM grazing allotments can include both public

and private lands. Federal public land is the majority surface ownership of parcels located within these grazing allotments.

There are 6 parcels proposed for leasing that are not located within the boundaries of a BLM grazing allotment and are not managed for livestock grazing by the BLM.

Environmental Consequences

Upland Vegetation Communities

Offering 24 parcels for lease would have no direct impacts on vegetation because no surface disturbance would occur. Any potential effects on water resources from the sale of lease parcels would occur at the time the leases are developed at the APD stage. Impacts to vegetation resources could occur during exploration, drilling, production, and abandonment. The potential direct, indirect and cumulative impacts from oil and gas development on vegetation resources are discussed in the HiLine FEIS (Volume I, pages 572-588). Any additional site-specific potential effects on vegetation resources from sale of lease parcels would occur at the time the leases are developed.

Each well could result in a range of 2.85 to 5.2 acres of short-term surface disturbance and 0.75 to 0.92 acres of long-term surface disturbance. For 11 wells, this equates to a range of 31.35 to 57.2 acres of short-term disturbance and 8.25 to 9.9 acres of long-term disturbance. Short-term surface disturbance is defined as any disturbance to vegetation resources during well pad and access road construction. Long-term surface disturbance is defined as loss of vegetative resources on production areas and access roads during the life of the well.
Surface disturbance is generally considered an adverse direct impact to grassland and shrubland communities. Impacts to vegetation resources as a result of surface disturbance would depend on the vegetation type/community, soil community and the topography of the lease parcels. Disturbance to vegetation is of concern because protection of soil resources, maintenance of water quality, conservation of wildlife habitat, and livestock production capabilities may be diminished or lost over the long-term through direct loss of vegetation (including direct loss of both plant communities and specific plant species). Surface disturbance directly affects vegetation by destroying habitat, mixing soil horizons, impacting biological crusts, disrupting seedbanks, burying individual plants, and generating sites for competitive, non-native plants including weedy species. Invasive species and noxious weed invasion could result in loss of desirable vegetation. Additionally, other vegetation impacts could also be caused from soil erosion and result in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Indirect effects to vegetation resources result from activities that alter the quality and health of vegetation communities. For example, activities that result in soil compaction, erosion, changes in hydrology, and encroachment of invasive plant species are considered indirect effects. Additionally, fugitive dust is an indirect effect of fluid mineral development generated by construction activities and travel along access roads that can affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil, fuel, wastewater

or other chemical spills could contaminate soils as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term vegetation damage could be expected.

Mitigation measures or other associated design features would be addressed during the site specific Application for Permit to Drill (APD) process of exploration and development. If needed, Conditions of Approval (COAs) would potentially include revegetation with desirable plant species, soil enhancement practices, direct live haul of soil material for seed bank revegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs, would be identified and addressed at the APD stage.

Livestock Grazing

Leasing any of the proposed parcels for this lease sale would have no direct impacts on range resources. Any potential effects from the sales of these leases would occur at the time the leases are developed. Subsequent development of the parcels would have direct impacts and indirect effects on livestock grazing managed by the BLM as a result of surface disturbing and production activities. Direct impacts would include loss of forage at production sites and on access roads. Indirect effects would include the creation avoidance of areas around production sites while activity is occurring and grazing management issues as a result of gates potentially being left open or damaged from oil and gas production and monitoring traffic. The proposed lease parcels which are located within BLM grazing allotments encompass 5,868 surface acres. Only 31 to 57 acres of short-term surface disturbance and 8 to 10 acres of long-term surface disturbance is reasonably expected to occur within a combined 155,514 acres of BLM grazing allotments. The direct impacts and indirect effects to livestock grazing managed by the BLM would be negligible.

There are no stipulations applied at the leasing state that address livestock grazing specifically. Development of a lease parcel undergoes a NEPA analysis during the Application for Permit to Drill (APD) stage of development. At the APD stage, the proponent proposes a location and description of the action; which allows the BLM to fully analyze the impacts from the proposed action.

Livestock grazing mitigation measures may be applied once development is proposed which could increase the operational complexity of a developed lease. These measures would provide for the protection of livestock watering facilities, upkeep and repair of fences/gates and cattle guards affected by oil and gas activities, minimization of forage loss, and prevention of mortality or injury to livestock. While these measures could potentially affect the feasibility of an oil and gas operation on a lease, they do not preclude leasing or development.

3.9 Invasive Species and Noxious Weeds

Affected Environment

An invasive species as defined in Executive Order 13112 is "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." Their vigor, combined with a lack of natural enemies, often leads to outbreak populations. Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the project area. These species could also affect upland health standards, wildlife habitat quality, and native species diversity. Surveys to detect invasive plants of concern to BLM have not been conducted on the identified parcels. It is likely that species such as Japanese Brome, Downy Brome, and yellow sweetclover exist on and near all parcels identified.

The State of Montana defines a Noxious Weed as "any exotic plant species established or that may be introduced in the state that may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities." Noxious weeds are plant species designated by federal or state law or county government. Noxious weed control is typically the responsibility of the surface owner or lease holder (federal and private), in cooperation with the local weed boards or county weed departments, when surface disturbance occurs. The BLM does not maintain inventory data for private surface.

On the BLM surface, there have been limited surveys of the parcels for the presence of noxious weed species. Invasive and Noxious Weed Surveys were conducted on parcel MTM 105431-HT and parcel MTM 105431-HR (Glasgow Field Office); no invasive plant species were identified.

There are several parcels on lands administered by the Havre Field Office that are in proximity to known infestations of noxious weeds that put them at higher risk of becoming infested if surface disturbance occurs. These include:

- MTM 108952-BQ – spotted and Russian knapweed can be found on county and access roads to this parcel
- MTM 108952-E7 – field bindweed is documented on this parcel
- MTM 108952-CR & CT– Large infestation of leafy spurge are currently being treated within a township to the north of these parcels.

Four of the 24 parcels on lands administered by the Malta Field Office have documented infestations of noxious weeds, including:

- Parcels MTM 79010-B3, B4 and A7 contains leafy spurge, which is currently being treated with Bio Control (flea beetles and Stem Borers)
- Parcel MTM 79010-HS contains leafy spurge found along the river corridor. Currently there is no treatment being administered. The southeast portion of this parcel is slated for a prescribed burn in 2018 to reduce the encroachment of prickly pear cactus.

Environmental Consequences

Offering 24 parcels for lease would have no direct impacts on invasive species and noxious weeds because no surface disturbance would occur. Any potential effects on water resources from the sale of lease parcels would occur at the time the leases are developed at the APD stage. Effects (both direct and indirect) would be realized when the lease is developed and be influenced by site specific conditions and proximity to current populations of Invasive Non-Native (INNS). These potential effects would be analyzed on a site-specific basis prior to lease development and during the APD stage of development.

Direct effects associated with development to INNS and noxious weeds would include surface disturbance that would allow site for invasive plants to colonize and dispersal vectors in the form of vehicles and equipment that can carry seed and propagative material from site to site.

Indirect effects associated from development would include ecological site alterations as a result from the spread of INNS and noxious weeds if actions are not taken to properly mitigate their establishment. Thus plant species composition could be reduced, and thus alter current habitat, forage availability, soil characteristics and fire frequency.

There are no stipulations applied at the lease stage that address INNS or noxious weeds. Development of a lease parcel undergoes a NEPA analysis during the Application for Permit to Drill (APD) stage of development. At the APD stage, the proponent proposes a location and description of the action; which allows the BLM to fully analyze the impacts from the proposed action and identify specific mitigation. Mitigation and Conditions of Approval (COAs) to reduce the occurrence and spread of INNS and noxious weeds may include:

- All vehicles and equipment will be cleaned to remove weed seed and propagative material prior to entering public lands. If a parcel is known to be infested, these items will be cleaned before leaving the infested area.
- The operator shall be responsible for weed control within the areas of operation. Weed control shall be required on disturbed land where weeds exist, including roads, pads, and other associated actions and adjacent land affected by weed colonization from activities related to development and maintenance. The operator SHALL consult with the Authorized Officer for acceptable weed control methods to ensure compliance with BLM requirements and policies.
- Seed used for reclamation shall be certified weed seed free.
- Straw, hay, mulch, and other organic erosion control materials shall be certified weed seed free.
- Should fill material or gravel be needed for the development and maintenance of the lease and associated actions, these materials shall come from a weed free source.

3.10 Special Status Species

Affected Environment

Special status species are animals that require particular management attention due to population or habitat concerns and are:

- federally listed threatened and endangered species and designated critical habitats;
- federally proposed species and proposed critical habitats;
- federal candidate species;
- delisted species within the 5 years following delisting; or
- Montana BLM sensitive species.

Migratory Grassland Birds

Grassland birds, a suite of species adapted to differing grassland habitats resulting from the combination of historical disturbances have exhibited the steepest, most consistent and widespread decline of any group of birds in North America (Knopf 1994). Sensitive Status Grassland Bird Species found within nominated parcels include Sprague's pipit, Baird's sparrow, Brewers sparrow, Chestnut-collared longspur, Long-billed curlew and McCowns longspur.

Large blocks of remaining native grasslands provide some of the best remaining habitat in the world for this group of birds. The number of grassland and shrub grassland bird species currently breeding in the planning area is probably quite similar to that of prehistoric times, but their relative and overall abundance may be quite different. This suite of species occupies a range of environmental conditions in grassland habitats, primarily related to grass height and density, and the relative abundance of these species is determined by the frequency and extent of disturbance factors in grassland systems such as grazing, fire, and weather events.

There are 24 parcel nominations for the March 18, 2018 Oil/Gas Lease Sale. Of these 24 parcels, 18 include high quality nesting habitat for Sprague's pipit (4,930.7 acres) as identified by Montana Natural Heritage Modeling. These parcels would also be considered important nesting habitat for other BLM Sensitive Status grassland birds identified above. The HiLine RMP prohibits surface occupancy and use from April 15 through July 15 in Sprague's pipit habitat to protect this nesting habitat (TL 13-47). Exceptions, modifications and waivers may apply.

Greater Sage-Grouse

The Greater sage-grouse (GRSG) habitat north of the Milk River is comprised of a relatively low density of silver sagebrush and a correspondingly low density of sage-grouse. The sage-grouse habitats in this area include private lands which, in some portions of this area, have a long history of grain farming and low to moderate densities of natural gas production. Energy development is identified as a present and widespread threat in this area (USFWS, 2013).

Of the 24 parcels nominated for the March 18, 2018 Oil/Gas Lease Sale, ten (3,213.7 acres) are within the General Habitat Management Area (GHMA) and two (760.0 acres) are within the

Priority Habitat Management Area (PHMA) of the HiLine Sub-region of the Rocky Mountain Region Planning Area for GRSG.

PHMA consists of BLM administered lands with limited impacts containing substantial and high quality GRSG habitat that supports high density GRSG populations. Management actions should emphasize the conservation and enhancement of sustainable GRSG habitat. The HiLine RMP prohibits surface occupancy and use within PHMA (NSO 11-152). Exceptions may apply. Also within PHMA, surface-disturbing projects must be submitted for analysis through the Montana Sage Grouse Conservation Program's Density Disturbance Calculation Tool.

GHMA consists of BLM-administered lands with or without ongoing or imminent impacts containing sage-grouse habitat outside of the priority areas. Management actions should maintain habitat for sustainable sage-grouse populations to promote movement and genetic diversity. The HiLine RMP states that, within General Habitat Areas, surface occupancy and use is prohibited within 0.6 miles of GRSG leks (NSO 11-151) and, within GHMA, surface-disturbing or disruptive activities may be restricted or prohibited within two miles of GRSG leks (CSU 12-67). Prior to surface-disturbing or disruptive activities a plan to maintain functionality of GRSG habitat will be prepared by the proponent and implemented upon approval by the authorized officer. This plan shall address how short-term and long-term direct and indirect effects to nesting and brood-rearing areas will be mitigated based on current science and research. Exceptions, modifications and waivers may apply.

An active lek is one that, at a minimum, has been confirmed to show evidence of two or more males lekking on-site for two subsequent years. Any lek that has gone 10 years with no sign of lek activity, supported by surveys conducted during three or more years over the last 10 years, would be deemed inactive. A lek site where habitat changes that have caused birds to permanently abandon a lek would be deemed extirpated.

- Valley County - there are no leks within the two nominated lease parcels in PHMA, but there are three active leks within three miles of the parcels.
- Blaine County – there is one lek in GHMA on Lease Parcel MTM 108952-E9. This lek did not have male attendance in 2017, but was active in 2014.
- Phillips County – there are no leks on any of the lease parcels in Phillips County, but there are three active leks within two miles of MTM 79010-HS and MTM 79010-HQ which are in GHMA.

One proposed lease parcel (MTM 79010-HQ) is in important winter habitat for GRSG. The area just north of the parcel consistently has one of the highest concentrations of wintering GRSG in the project area. As many as 200 individuals have been documented in a relatively small area approximately 300 m north of the proposed lease parcel. Exceptions, modifications and waivers may apply to GRSG winter habitat. Stipulation TL13-43 applies to this parcel, which prohibits surface occupancy and use from December 1 through March 31 in Greater Sage-Grouse winter range.

Environmental Consequences

Offering 24 parcels for lease would have no direct impacts on special status wildlife species and habitat because no surface disturbance would occur. Any potential effects on special status wildlife resources from the sale of lease parcels would occur at the time the leases are developed at the APD stage. At the leasing stage, which this document covers, the location and extent of development is unknown. The field office developed a "Reasonably Foreseeable Development scenario" (RFD) that helps specialists predict the extent of oil and gas development per year (Chapter 3.2).

Migratory Grassland Birds

Oil and gas development has reduced bird abundance in grasslands (Kalyn Bogard and Davis 2014). Roads and trails are commonly associated with oil and gas development because wells need to be visited for maintenance. The presence of roads also reduces bird abundance in adjacent habitats (Sutter et al. 2000, Ingelfinger and Anderson 2004), and may reduce reproductive success for those individuals that do occupy these areas (Halfwerk et al. 2011). A study in southeastern Alberta, Canada indicated Sprague's Pipits and Baird's Sparrows tended to avoid nesting within 100 m of trails, and both of these species fledged fewer young from successful nests near trails (Ludlow, et al 2015).

Eighteen nominated parcels have been identified as possessing high quality nesting habitat for Sprague's pipit and other sensitive status grassland birds. Some parcels only have portions of important habitat, while others are entirely important nesting habitat (4,930 acres).

Of these important nesting habitat areas, 107 acres are identified as "high" potential for oil and gas development, 2,562 acres are "moderate" potential, 1,501 acres "low" potential and 760 acres are "very low" potential. Based on this potential, it is anticipated that 8.8 wells, along with associated roads and pipelines, would be developed in important nesting habitat for migratory grassland birds (Table 7). This will lead to a short-term disturbance of 25.08-45.76 acres and long-term disturbance of 6.6-7.92 acres.

Direct impacts from subsequent development of the lease parcels would be the loss of 31.68-53.68 acres of nesting habitat. Indirect impacts to migratory grassland birds would include avoidance and/or increased nest predation for approximately 100 m adjacent to well pads, access roads and pipelines as well as increased human disturbance during the breeding, nesting and brood-rearing season.

A timing limit of April 15 through July 15 (TL13-47) will help mitigate disturbance to breeding and nesting Sprague's pipit and other grassland birds during the development phase. Public use in the lease parcel areas is generally low and dispersed, especially during the migratory grassland bird breeding and nesting season. During the development and production phases and associated activities, there will be a long-term increase in human disturbance.

Greater Sage-Grouse

Sage-grouse populations can be significantly reduced, and in some cases locally extirpated, by non-renewable energy development activities, even when mitigated measures are implemented (Walker *et al.* 2007).

Two nominated parcels (760 acres) are within a Priority Habitat Management Area. While these parcels are available for leasing, they require a No Surface Occupancy stipulation (NSO 11-52). By not permitting surface disturbing/disruptive activities on these parcels, no effect on Greater sage-grouse nesting and breeding activities is expected.

There are 10 nominations (3,214 acres) that are partially or entirely within Greater sage-grouse GHMA. 925 acres are within "low" potential for oil and gas development and 2,289 acres are within "moderate" potential. Based on this potential, it is anticipated that 9.3 wells, along with associated roads and pipelines, would be developed in GHMA (Table 7). This will lead to a short-term disturbance of 26.51-48.36 acres and long-term disturbance of 6.98-8.56 acres.

Direct impacts from subsequent development of the parcels would be the loss of 33.49-56.92 acres of GHMA. Indirect impacts would include additional traffic in the lease parcels areas of weekly or more frequent visits during the development and production phases at each well site. During the winter months, this could constitute a significant increase over the current, low and dispersed level of public use.

Controlled surface use within 2 miles of GRSG leks (CSU 12-67) and no surface occupancy within 0.6 miles of GRSG leks (NSO 11-151) will help reduce impacts to breeding and nesting grouse within GHMA. In addition, the proponent will be required to develop a plan to maintain functionality of GRSG habitat prior to surface-disturbing or disruptive activities. This plan shall address how short-term and long-term direct and indirect effects to nesting and brood-rearing areas will be mitigated based on current science and research.

One nominated parcel (9.8 acres) is within GRSG winter range. This parcel is within "moderate" potential for oil and gas development. It is estimated that no wells will be drilled on the parcel, itself, probably due to the fact that it is within the channel of the Milk River. If directional drilling would take place from adjacent lands, the timing restriction from December 1 through March 31 would help mitigate impacts to GRSG winter range.

3.11 Big Game

Affected Environment

The optimum habitat for pronghorn consists of open, rolling sagebrush grassland, as free from human disturbance as possible. Browse, primarily sagebrush, is vital in the pronghorn diet. Pronghorn utilize the sagebrush grassland habitats almost exclusively during the winter. Pronghorn from Canada and north of the Milk River migrate along major drainages to winter concentration areas along the Milk River during severe winters. Mule deer prefer topography

such as coulees and more rugged terrain. Sagebrush is extremely important and for food and cover (Vore, 2012).

Energy development from oil and natural gas production and supporting infrastructure has been shown to influence pronghorn distribution and habitat use (Beckmann et al. 2012). Habitat loss and fragmentation by roads and oil/natural gas development can lead to increased energy needed for pronghorn to remain vigilant, and consequently can affect the direction, distance and timing that pronghorn migrate (Beckmann et al. 2012). Pronghorn highly avoided increased well and road densities compared to lower densities of these features (Jakes, 2015).

There are 24 parcel nominations for the March 18, 2018 Oil/Gas Lease Sale. Of these 24 parcels, 15 include big game winter range habitat (5,002.7 acres). Big game species will include pronghorn and mule deer. In some cases, both species will overlap and in others, only one of the species is identified. For the purposes of this document, they will be classified together. The HiLine RMP (TL 13-48) prohibits surface occupancy and use from December 1 through May 15 in big game winter range. Exceptions, modifications and waivers may apply.

Environmental Consequences

Offering 24 parcels for lease would have no direct impacts on big game because no surface disturbance would occur. Any potential effects on big game from the sale of lease parcels would occur at the time the leases are developed at the APD stage. Extensive energy development is potentially the most serious threat to mule deer and pronghorn populations. Direct impacts from this type of development include the loss of habitat to well pads, access roads and pipelines. Indirect impacts include changes in distribution, stress and/or activity levels caused by increased human disturbances (i.e. traffic, noise and overall human use) associated with energy development (Sawyer et al. 2002). During the winter months, unnecessary energy expenditures caused by increases in human activity can negatively impact reproduction rates and lead to overall decreases in individual survival, especially in fawns (Parker et al. 1984).

Fifteen nominated parcels have been identified as containing winter range for either pronghorn, mule deer or both (5,003 acres). Only 120 acres are within "high" potential for oil and gas development. The remaining is 760 acres in "very low" potential, 1,450 acres in "low" potential and 2,673 acres in "moderate" potential. Based on this potential, it is anticipated that 10.2 wells, along with associated roads and pipelines, would be developed in big game winter range (Table 7). This will lead to a short-term disturbance of 29.07-53.04 acres and long-term disturbance of 7.65-9.38 acres.

Direct impacts from subsequent development of the parcels would be the loss of 36.72-62.42 acres of winter habitat. Indirect impacts would include additional traffic in the lease parcels areas of weekly or more frequent visits during the development and production phases at each well site. This could constitute an increase over the current, low and dispersed level of public use.

Prohibiting surface occupancy and use from December 1 through May 15 (TL 13-48) will help mitigate short-term direct impacts to big game winter habitat.

3.12 Cultural Resources

Affected Environment

The BLM is responsible for identifying, protecting, managing, and enhancing cultural resources which are located on public lands, or that may be affected by BLM undertakings on non-Federal lands, in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. The procedures for compliance with the NHPA are outlined in regulation under 36 CFR 800. Cultural resources include archaeological, historic, and architectural properties, as well as traditional life-way values and/or traditional cultural properties important to Native American groups.

It is anticipated that some lease parcels may contain prehistoric Native American sites; traditional cultural properties (TCP); historic ranching, homesteading and perhaps some mining sites that have not yet been documented. A review of the Montana State Historic Preservation Office (SHPO) and BLM Cultural Resource Databases shows that seven cultural resource inventories have been conducted in the sections of the proposed parcels for the oil and gas lease sale, all of which are located within the Havre Field Office.

There have been 63 cultural properties recorded within the confines of the proposed parcels. **Table 13** summarizes the information obtained from Class III Cultural Resource inventories (by estimated percentage) which has occurred to date within the proposed lease parcel boundaries. Data includes the cultural location ID, National Register of Historic Places (NRHP) eligibility determinations (if known), Class III inventory records numbers, and a brief description of the adequacy of the inventories performed.

Table 13: Summary of Cultural Resource Locations, Inventory Reports and Percent of Lease Parcels surveyed to Class III Standards

PARCEL NUMBER	FIELD OFFICE	CULTURAL LOCATIONS WITHIN PARCEL SECTION	INVENTORIES W/N PARCEL	EST. % OF PARCEL SURVEYED	COMMENTS
93096	HFO	24CH0883 (Historic Road/Trail, Eligible)	NONE	0%	NONE
108952-CR	HFO	NONE	NONE	0%	NONE
108952-CT	HFO	NONE	NONE	0%	NONE
108952-FC	HFO	24HL0935 (Historic Reclamation, Eligible) , 24HL0859 (Stone circle, Unresolved)	HL 6 30011	0%	NONE
108952-CU	HFO	NONE	HL 4 24221	0%	NONE
108952-BQ	HFO	NONE	23-26-20	0%	PREVIOUS CLASS III INVENTORY PERFORMED BUT NOT ADEQUETE
108952-E6	HFO	24BL2344 (Stone circle, Unresolved) , 24BL2347 (Stone circle, Unresolved) , 24BL0876 (Stone circle, Unresolved), 24BL2334 (Stone circle, Unresolved) ,	BL 2 34154	10%	PREVIOUS CLASS III INVENTORY PERFORMED

PARCEL NUMBER	FIELD OFFICE	CULTURAL LOCATIONS WITHIN PARCEL SECTION	INVENTORIES W/N PARCEL	EST. % OF PARCEL SURVEYED	COMMENTS
		24BL2351 (Stone circle, Unresolved), 24BL2338 (Stone features, Unresolved)			BUT PORTIONS NOT ADEQUETE
108952-FB	HFO	24BL2337 (Historic Homestead, Unresolved), 24BL2339 (Stone circle, Unresolved) , 24BL0248 (Stone circle, Unresolved) , 24BL2300 (Stone circle, Unresolved) , 24BL2377 (Historic Homestead, Unresolved), 24BL2380 (Stone Alignment, Unresolved), 24BL2353(Stone Circle, Unresolved)	BL 2 34154	10%	PREVIOUS CLASS III INVENTORY PERFORMED BUT PORTIONS NOT ADEQUETE
108952-E7	HFO	NONE	BL 2 28329	10%	PREVIOUS CLASS III INVENTORY PERFORMED BUT PORTIONS NOT ADEQUETE
108952-E8	HFO	NONE	NONE	0%	NONE
108952-E9	HFO	24BL0308 (Historic Foundation, Not Eligible) , 24BL0309 (Stone circle, Unresolved)	NONE	10%	PREVIOUS CLASS III INVENTORY PERFORMED BUT PORTIONS NOT ADEQUATE
108952-FA	HFO	24BL0778 (Homestead, Unresolved) , 24BL1681 (Fire Cracked Rock, Unresolved)	BL 2 20384	5 %	NONE
79010-PX	HFO	24BL1145 (Historic Irrigation,, Eligible), 24BL1812 (Stone circle, Unresolved) , 24BL2008 (Historic Irrigation, Eligible	NONE	0%	NONE
79010-C1	HFO	24GL1123 (Stone circle, Unresolved)	NONE	0%	NONE
79010-A8	MFO	NONE	NONE	0%	NONE
79010-B4	MFO	NONE	NONE	0%	NONE
79010-A4	MFO	NONE	NONE	0%	NONE
79010-B3	MFO	NONE	NONE	0%	NONE
79010-B9	MFO	24PH3757 (Stone circle, Unresolved)	NONE	0%	NONE
79010-C1	MFO	24PH0048 (Stone circle, Unresolved), 24BL0049 (Stone circle, Unresolved), 24BL0050 (Stone circle, Unresolved), 24BL0051(Stone circle, Unresolved), 24BL0052 (Stone circle, Unresolved), 24BL0053 (Stone circle, Unresolved), 24BL0054 (Stone circle, Unresolved), 24BL0077 (Stone circle, Unresolved)	NONE	LESS THAN 1%	NONE
79010-HS	MFO	24PH1066 (White Ditch System, Unresolved), 24PH2459 (Lithic Scatter, Unresolved), 24PH3921 (Lithic Scatter, Unresolved),	NONE	5%	PREVIOUS CLASS III INVENTORY PERFORMED

PARCEL NUMBER	FIELD OFFICE	CULTURAL LOCATIONS WITHIN PARCEL SECTION	INVENTORIES W/N PARCEL	EST. % OF PARCEL SURVEYED	COMMENTS
		24PH4363 (Lithic Scatter, Unresolved), 24PH2180 (Homestead, Unresolved), 24PH2783 (Lithic Scatter, Unresolved), 24PH2412 (Lithic Scatter, unresolved), 24PH2413 (Stone Circle, Unresolved), 24PH2414 (Stone Cairn, Unresolved), 24PH2415 (Stone Cairn, Unresolved), 24PH2416 (Stone Circle, Unresolved), 24PH2418 (Stone Alignment, Unresolved), 24PH2419 (Lithic Scatter, Unresolved), 24PH2422 (Lithic Scatter, Unresolved), 24PH2440 (Lithic Quarry, Unresolved), 24PH2445 (Lithic Quarry, Unresolved) ,24PH2423 (Stone Circle, Unresolved), 24PH2450 (Lithic Scatter, Unresolved), 24PH2431 (Stone Circle, Unresolved) 24PH2425 (Stone Circle, Unresolved), 24PH2432 (Stone Circle, Unresolved), 24PH2426 (Lithic Quarry, Unresolved), 24PH2436 (Stone Cairn, Unresolved)			BUT PORTIONS NOT ADEQUETE
79010-HQ	MFO	NONE	NONE	5%	NONE PREVIOUS CLASS III INVENTORY PERFORMED BUT PORTIONS NOT ADEQUETE
108431-HR	GFO	24VL1880 (Stone Cairn, Unresolved), 24VL1879 (Stone Circle, Unresolved), 24Vl1158 (Historic Homestead, Unevaluated), 24VL1159 (Stone Circle, Unresolved), 24VL0910 (Stone Circles, Unresolved)	NONE	10%	NONE
105431-HT	GFO	24VL1158 (Historic Homestead, Unevaluated), 24VL1879 (Stone Circles, Unresolved)	NONE	10%	NONE

*GFO = Glasgow Field Office, MFO = Malta Field Office, HFO = Havre Field Office

The overwhelming majority of previously recorded sites within the proposed lease parcels are prehistoric which can be classified into four functional types – habitation, procurement, industrial, and ritual – as determined from features, artifacts, and other cultural remains present.

Habitation sites consist of features/materials which indicate everyday domestic activities including, but not limited to, clothing construction and food preparation. Examples of such sites are debris scatters (middens or trash scatters), hearths, cairns (stone piles), and tipi rings.

Procurement sites consist of features representing specific subsistence activities such as hunting bison, deer, or pronghorn, and gathering wild plants. Buffalo jumps, traps, and impoundments (with associated processing areas) are the most common procurement sites in the resource area. Such sites are characterized by large deposits of bones at the base of bluffs and cliffs or in steep coulees.

Industrial sites are generally represented by scatters of stone waste debris (debitage), hammer stones, rough or damaged tools, and chunks of fine-grained stone and quartzite. The best source material can be found in Valley and Phillips Counties.

Ritual or ceremonial sites include rock art panels, burials, medicine wheels, intaglios, cairns, and rock or wooden vision quest structures.

Archaeological Site Density and Distribution

The average site density for prehistoric sites in the general area has been calculated at one site per 66 acres (Walker-Kuntz and Walker-Kuntz 2007, 49). This site density figure is misleading because the sites are not randomly distributed across the landscape, but are more numerous in some areas than in others.

The archaeological site distribution pattern of the glaciated prairie in Phillips and Valley Counties is considered quasi-random in nature; that is, sites are distributed randomly across large portions of the landscape, without regard to general landform types or environmental zones, but there are also certain areas where sites are concentrated. The random distribution pattern occurs in the undifferentiated uplands of the glaciated prairie or rolling hinterlands; the sites found here are invariably small habitation and industrial types (tipi rings, cairns, and lithic scatters).

The concentrated pattern occurs along the principal drainages or in moraine areas; these areas contain large numbers of small and large habitation sites, as well as most procurement and ritual/ceremonial sites. Also, site densities appear to vary with respect to ecological zones (sagebrush/grass plains, river breaks, forested escarpments and plains, and forested mountains and foothills), and sites tend to be concentrated on major topographical features (ridges, buttes, escarpments, stream terraces, toe slopes, etc.)

Cultural Resource Notice CR 16-1 and Lease Notice 14-38 were applied to all lease offerings. The Notices are nearly identical and state:

> *CR 16-1: This lease may be found to contain historic properties or resources protected under National Historic Preservation Act (NHPA), the American Indian Religious Freedom Act (42 U.S.C. 1996), Native American Graves Protection and Repatriation Act (25U.S.C. 3001 et seq.), Executive Order 13007 (May 24, 1996), or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., state historic preservation officer and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to*

protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.

Environmental Consequences

The direct, indirect, and cumulative effects of oil/gas leasing on cultural resources was analyzed in the HiLine Resource Management Plan FEIS, and is incorporated by reference into this analysis. Offering 24 parcels for lease would have no direct impacts on cultural resources because no surface disturbance would occur. Any potential effects on cultural resources from the sale of lease parcels would occur at the time the leases are developed at the APD stage.

Leasing a nominated parcel gives a basic right to the operator to develop the lease. Leasing would not, however, result in effects to cultural resources at this stage. It is only when the lease is developed that there is a potential for cultural resources to be affected by the proposed action. That is when the drilling location is known and cultural resource investigations can be centered on that location and other related developments such as roads, transmission lines, and pipelines. At the APD stage when specific oil and gas development actions are proposed, the area of potential effect (APE) will be defined and assessments of the impacts on cultural resources will be undertaken in order to comply with Section 106 of the National Historic Preservation Act (NHPA) and BLM's 8100 Manual Series. A Class III cultural resource inventory will be necessary for those parcels not previously surveyed and for those parcels which have been judged inadequately surveyed in the past. Lease Stipulations 11-137, 12-60 and14-24 will apply to all parcels (Appendix A). In the event that cultural resources are identified within the APE, an evaluation of National Register eligibility will occur for each identified cultural resource. Mitigation measures for cultural resources determined to be eligible to the National Register of Historic Places (NRHP) will have to be followed for those cultural resources directly and/or indirectly impacted by the proposed development.

Direct and indirect impacts are not anticipated from leasing nominated parcels. It is at the APD stage of development that specific impacts can be correctly assessed. Potential direct impacts to cultural resources at the APD stage include damage to archaeological sites through construction activities (e.g. pad construction, road building, well drilling), increased erosion from surface activities, and increased travel and vandalism resulting from improved access to the area. Potential indirect impacts include abrasive dust and vibrations from drilling equipment and damage to rock art sites from gas emissions. Conversely, cultural resource investigations associated with development adds to our understanding of the prehistory and history of the area under investigation.

Indirect effects from surface disturbances associated with exploration and development activities after leasing have the potential to alter the characteristics of a significant cultural or historic property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Other effects to cultural resources from proposed surface disturbance activities include the destruction, damage, or alteration to all or part of the cultural resource and diminishing the property's significant historic features as a result of the introduction of visual, atmospheric, or audible elements. This could include altering or diminishing the elements of a National Register eligible property and diminish an eligible

property's eligibility status. Cultural resource investigations associated with development potentially adds to our understanding of the prehistory/history of the area under investigation and discovery of sites that would otherwise remain undiscovered due to burial or omission during review inventories.

Specific mitigation measures, such as site avoidance or data recovery through excavation, would have to be determined when project specific development proposals are received. In almost all situations, direct impacts to cultural resources could be avoided by relocating well sites and pipelines. As described in Chapter 2, the Reasonably Foreseeable Development scenario estimates 11 wells could potentially be developed from this lease sale, with a range of 31.35 to 57.2 acres of short-term disturbance and 8.25 to 9.9 acres of long-term disturbance. Given the relatively small number of acres to be disturbed by anticipated development, it is unlikely that it would be necessary to mitigate adverse impacts to archaeological sites through data recovery efforts. It should be noted that BLM has discretional control over mitigation stipulations measures imposed on a project. Although a lessee has a right to develop a lease, BLM may require development activities to be moved up to 200 meters in any direction. This should allow nearly all sites to be avoided. Should development uncover subsurface sites, the lessee is required to halt all work until the site can be evaluated and proper mitigation measures can be implemented

The use of standard lease terms protects vulnerable significant cultural resource values on these lease parcels (refer to Appendix A). The application of these requirements at the leasing phase provide protection to cultural values or at least notification to the lessee that potentially valuable cultural resource values are or are likely to be present on the lease parcels.

Specific mitigation measures, including but not limited to, possible site avoidance, excavation or data recovery would have to be determined when site-specific development proposals are received. However, in most surface-disturbing situations cultural resources would be avoided by project redesign or relocation. If significant properties cannot be avoided, appropriate strategies would be implemented to mitigate potential impacts in accordance with existing federal regulations.

In addition, each nominated lease parcel would have the standard lease notice attached and the special cultural resource stipulation as written in the HiLine RMP. Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

3.13 Native American Religious Concerns

Affected Environment

BLM's management of Native American Religious concerns is guided through its 1780 Manual: *Tribal Consultation Under Cultural Resources Authorities* and 1780 Handbook: *Guidelines for Conducting Tribal Consultation*. It is BLM policy that leasing is considered an undertaking as defined in the National Historic Preservation Act. Generally areas of concern to Native Americans are referred to as "Traditional Cultural Properties" (TCPs) which are defined as

cultural properties eligible for the National Register because of its association with cultural practices or beliefs that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community.

The area that makes up the proposed lease parcels was at one time the aboriginal lands of multiple tribes. These tribes include Piegan, Blood, Blackfeet, Gros Ventre, Assinboine, Sioux, Flathead (Salish), and Cree Tribes.

Previous consultation with tribes indicates that they use certain areas for religious and cultural purposes. Certain types of archaeological sites have cultural and religious significance. These include vision quest sites, monumental/ anthropomorphic/zoomorphic rock features, rock art sites, burials, habitation sites with special purpose ceremonial structures, and ceremonial and/or dance grounds. No defined Traditional Cultural Properties have been identified within the proposed lease parcels however; a significant cultural location (Sweet Grass Hills and Big Bend of the Milk) has been identified nearby.

The Sweet Grass Hills and Big Bend of the Milk ACEC's contain an abundance of archaeological sites with unique characteristics and scientific values which warrant special attention. Theses ACEC's consists of numerous large sites which contain bison kills and ceremonial and habitation sites. These sites are characterized by unique stone surface features and multiple occupation episodes. Other important, but lesser known sites nearby are unnamed bison kills, drive lines, meat processing sites and tipi ring concentrations.

Environmental Consequences

The direct, indirect, and cumulative effects of oil/gas leasing on Native American religious concerns was analyzed in the HiLine Resource Management Plan FEIS, and is incorporated by reference into this analysis.

Offering 24 parcels for lease would have no direct impacts on Native American religious concerns. Any potential effects from the sale of leases would occur at the time the leases are developed at the APD stage.

The BLM WO IM-2005-003 notes that while a lease does not authorize specific on-the-ground activities, and no ground disturbance can occur without further authorization from BLM and the surface management agency, but unless proscribed by stipulation, lessees can expect to drill somewhere on a lease unless precluded by law. Because there is no ground disturbance, leasing would not directly impact TCPs and/or areas of religious or cultural importance to tribes. A lease sale would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007. It would not prevent tribes from visiting sacred sites or prevent possession of sacred objects.

Indirect effects from site specific development proposals could have an impact to Native American religious practices and TCPs. The application of Stipulation 14-24 to all lease parcels ensures that BLM's obligations under NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, and other statutes as applicable will be met. At the APD stage when specific oil and gas development actions are proposed, the

area of potential effect (APE) will be defined and federally recognized tribes will be consulted if necessary. Additional NSO or CSU Stipulations may be necessary if TCPs or properties of religious and cultural importance are identified at the APD stage.

3.14 Paleontology

Affected Environment

According to Section 6301 of the Paleontological Resource Protection Act of 2009 Omnibus Public Lands Bill, Subtitle D, SEC. 6301, paleontological resources are defined as "any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth" (Paleontological Resource Protection Act of 2009 Omnibus Lands Bill, Subtitle D, SEC. 6301-3612 (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 431-433). All vertebrate fossils, be they fossilized remains, traces, or imprints of vertebrate organisms, are considered significant. Paleontological resources do not include archaeological and cultural resources.

Occurrences of paleontological resources are closely related to the geologic units that contain them, and the potential for finding important paleontological resources can be broadly predicted by the presence of the pertinent geologic units at or near the surface. Therefore, geologic mapping can be used as a proxy for assessing the potential occurrence of important paleontological resources. The PFYC system adopted by the BLM in 2008, and revised in 2016, uses geologic units as base data. This system provides a uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts.

Under the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is best applied at the geologic formation or member level. It is not intended to be an assessment of whether important fossils are known to occur occasionally in these units (i.e. a few important fossils or localities widely scattered throughout a formation does not necessarily indicate a higher class), nor is it intended to be applied to specific sites or areas. The classification system is intended to provide baseline guidance to assessing and mitigating impacts to paleontological resources. In many situations, the classification should be an intermediate step in the analysis, and should be used to assess additional mitigation needs. The PFYC classes are defined in detail below:

Class 1 – **Very Low**. Geologic units that are not likely to contain recognizable paleontological resources. Units assigned to Class 1 typically have one or more of the following characteristics:

- Geologic units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
- Geologic Units are Precambrian in age.

(1) Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable.

(2) Paleontological mitigation is unlikely to be necessary except in very rare or isolated circumstances that result in the unanticipated presence of paleontological resources, such as unmapped geology contained within a mapped geologic unit. For example, young fissure-fill deposits often contain fossils but are too limited in extent to be represented on a geological map; a lava flow that preserves evidence of past life, or caves that contain important paleontological resources. Such exceptions are the reason that no geologic unit is assigned a Class 0.

Overall, the probability of impacting significant paleontological resources is very low and further assessment of paleontological resources is usually unnecessary. An assignment of Class 1 normally does not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate an unanticipated discovery.

Class 2 – **Low**. Geologic units that are not likely to contain paleontological resources. Units assigned to Class 2 typically have one or more of the following characteristics:

- Field surveys have verified that significant paleontological resources are not present or are very rare.
- Units are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely.

(1) Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low and further assessment is usually unnecessary except in occasional or isolated circumstances.

(2) Paleontological mitigation is only necessary where paleontological resources are known or found to exist.

The probability of impacting significant paleontological resources is low. Localities containing important paleontological resources may exist, but are occasional and should be managed on a case-by-case basis. An assignment of Class 2 may not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate unanticipated discoveries.

Class 3 – **Moderate**. Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Units assigned to Class 3 have some of the following characteristics:

- Marine in origin with sporadic known occurrences of paleontological resources.
- Paleontological resources may occur intermittently, but abundance is known to be low.
- Units may contain significant paleontological resources, but these occurrences are widely scattered.
- The potential for an authorized land use to impact a significant paleontological resource is known to be low-to-moderate.

(1) Management concerns for paleontological resources are moderate because the existence of significant paleontological resources is known to be low. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting.

(2) Paleontological mitigation strategies will be proposed based on the nature of the proposed activity.

This classification includes units of moderate or infrequent occurrence of paleontological resources. Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4 – **High**. Geologic units that are known to contain a high occurrence of paleontological resources. Units assigned to Class 4 typically have the following characteristics:

- Significant paleontological resources have been documented, but may vary in occurrence and predictability.
- Surface disturbing activities may adversely affect paleontological resources.
- Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
- Illegal collecting activities may impact some areas.

(1) Management concerns for paleontological resources in Class 4 are moderate to high, depending on the proposed action.

(2) Paleontological mitigation strategies will depend on the nature of the proposed activity, but field assessment by a qualified paleontologist is normally needed to assess local conditions.
The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required and on-site monitoring or spot-checking may be necessary during land disturbing activities. In some cases avoidance of known paleontological resources may be necessary.

Class 5 – **Very High**. Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources. Units assigned to Class 5 have some or all of the following characteristics:

- Significant paleontological resources have been documented and occur consistently.
- Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities.
- Unit is frequently the focus of illegal collecting activities.

(1) Management concerns for paleontological resources in Class 5 areas are high to very high.

(2) A field survey by a qualified paleontologist is almost always needed. Paleontological mitigation may be necessary before or during surface disturbing activities.

The probability for impacting significant paleontological resources is high. The area should be assessed prior to land tenure adjustments. Pre-work surveys are usually needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.

***Class U* – Unknown Potential.** Geologic units that cannot receive an informed PFYC assignment. Characteristics of Class U may include:

- Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known.
- Geological units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail.
- Scientific literature does not exist or does not reveal the nature of paleontological resources.
- Reports of paleontological resources are anecdotal or have not been verified.
- Area or geologic unit is poorly or under-studied.
- BLM staff has not yet been able to assess the nature of the geologic unit.

(1) Until a provisional assignment is made, geologic units that have an unknown potential have medium to high management concerns.

(2) Lacking other information, field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

An assignment of "Unknown" may indicate the unit or area is poorly studied, and field surveys are needed to verify the presence or absence of paleontological resources. Literature searches or consultation with professional colleagues may allow an unknown unit to be provisionally assigned to another Class, but the geological unit should be formally assigned to a Class after adequate survey and research is performed to make an informed determination.

***Class W* – Water.** Includes any surface area that is mapped as water. Most bodies of water do not normally contain paleontological resources. However, shorelines should be carefully considered for uncovered or transported paleontological resources. Reservoirs are a special concern because important paleontological resources are often exposed during low water intervals. In karst areas sinkholes and cenotes may trap animals and contain paleontological resources. Dredging river systems may result in the disturbance of sediments that contain paleontological resources.

***Class I* – Ice.** Includes any area that is mapped as ice or snow. Receding glaciers, including exposed lateral and terminal moraines should be considered for their potential to reveal recently exposed paleontological resources. Other considerations include melting snow fields that may contain paleontological resources with possible soft-tissue preservation.

The BLM classified geologic formations that have a high Potential Fossil Yield Classification (PFYC) of 3 or higher, or are ranked as unknown, should be specifically reviewed for paleontological resources. The parcels involved in this evaluation have one or more of the geologic units listed in Table 14.

Table 14: Geologic units and PFYC rank within the lease parcels.

Rock Unit	PFYC rank	Typical Paleontological Resources
Alluvium	2	If young, usually few fossils, but if older could have some
Sand and Gravel	Unknown	Older deposits can preserve animals like *Bison*, mammoth, and other Ice Age fauna
Bearpaw Shale	3	Common ammonites, mollusks, rare crabs, and occasional marine reptiles and dinosaurs
Judith River	5	Dinosaurs and other vertebrates common
Claggett	3	Ammonites, baculites, cephalopods, rare crabs, also leaves, fish, shark teeth, dinosaurs, marine reptiles, and birds
Two Medicine	5	Significant dinosaur finds including eggs, juveniles, and nests, bird, mammals, sometimes in large bonebeds
Marias River Shale	3	Variety of ammonites, scaphites, bivalves, forams, and burrows

All or parts of 22 parcels include geologic units with a PFYC of 3 or higher, or unknown, and so they must be further analyzed by a professional BLM-permitted consultant prior to ground disturbing actions. Two parcels will not need further assessment, but any unanticipated finds should be immediately reported to BLM.

Environmental Consequences

The direct, indirect, and cumulative effects of oil/gas leasing on paleontology was analyzed in the HiLine Resource Management Plan FEIS, and is incorporated by reference into this analysis.

Offering 24 parcels for lease would have no direct impacts on paleontological resources because no surface disturbance would occur. Any potential effects from the sale of leases would occur at the time the leases are developed at the APD stage.

The surface disturbances associated with oil and gas exploration and development activities could have indirect effects to paleontological resources primarily in areas classified as Potential Fossil Yield Classification (PFYC) 4 or 5 areas. Surface-disturbing activities could potentially alter the characteristics of paleontological resources through damage, fossil destruction, or disturbance of the stratigraphic context in which paleontological resources are located, resulting in the loss of important scientific data. However, for surface-disturbing situations, paleontological resources could be avoided by project redesign or relocation before project approval which would negate the need for the implementation of mitigation measures.

Conversely, surface-disturbing activities can also potentially lead to the discovery of paleontological localities that would otherwise remain undiscovered due to burial or omission during review inventories. The scientific study to retrieve and interpret important paleontological resource information provides a better understanding of the nature and distribution of those resources. The retrieval and interpretation of information is most successful and meaningful when a site is left intact.

Once a parcel is leased, the application of standard lease terms (movement of activities by 200 meters or delay of up to 60 days) would protect vulnerable significant paleontological resource values on these lease parcels. In most instances this may be sufficient to provide the necessary protection to paleontological values. However, the application of standard lease terms may not always adequately protect paleontological values. In order to protect paleontological values, paleontological resources management relies on the application of Lease stipulation NSO 11-139, CSU 12-61, applied at the leasing phase to provide protection to paleontological resources or at least provide notification to the lessee that potentially significant paleontological resources are or are likely to be present on the lease parcels should the lease parcel fall within one of the designated PFYC Class 4 or 5 significant geologic formations which have a record of producing significant fossils.

The use of standard lease terms and lease stipulations protect paleontological resource values on these lease parcels (refer to Appendix A and B). The paleontological lease notice would be applied to those lease parcels that fall within the PFYC ,3,4 or 5 areas (see **Table 15**), requiring a field survey prior to surface disturbance. The application of these requirements at the leasing phase provides protection to paleontological values and would result in a better understanding of the nature and distribution of those resources.

Table 15: PFYC Classifications of proposed lease Parcels.

Parcel	Notes	PFYC Classification
MTM 93096	Marias River	3
MTM 108952-CR	Judith River	5
MTM 108952-CT	Claggett Alluvium	3,2
MTM 108952-FC	Judith River Alluvium	5,2
MTM 108952-CU	Bearpaw Alluvium	3,2
MTM 108952-BQ	Judith River Alluvium Bearpaw	5,2,3
MTM 108952-E6	Bearpaw Alluvium	3,2
MTM 108952-FB	Bearpaw Alluvium	3, 2
MTM 108952-FB	Bearpaw Alluvium	3,2
MTM 108952-E8	Bearpaw Alluvium	3,2

Parcel	Notes	PFYC Classification
MTM 108952-E9	Bearpaw Alluvium	3,2
MTM 108952-FA	Bearpaw Alluvium	3,2
MTM 79010-PX	Judith River Alluvium	5, 2
MTM 79010-A8	Judith River Alluvium Sand and Gravel Unknown	5,2, Unknown
MTM 79010-B4	Judith River Alluvium	5,2
MTM 79010-A4	Judith River Alluvium	5,2
MTM 79010-B3	Alluvium	2
MTM 79010-B9	Judith River Claggett Alluvium	5,3, 2
MTM 79010-C1	Judith River Alluvium	5,2
MTM 79010-HS	Alluvium Landslide just a small Claggett	2, 2, 3
MTM 79010-HQ	Alluvium	2
MTM 105431-HR	Sand and Gravel Bearpaw	UK, 3
MTM 105431-HT	Bearpaw	3
MTM 79010-CI	Two Medicine	5

These inventory requirements should result in the identification of paleontological resources and avoidance or mitigation of significant localities before permit approval and prior to surface disturbance. However, the application of standard lease terms only allows the relocation of activities up to 200 meters, unless documented in the NEPA document, and cannot result in moving the activity off lease.

Specific mitigation measures could include, but are not limited to, site avoidance or excavation. Avoidance of paleontological properties would be a best management practice. However, should a paleontological locality be unavoidable, significant properties would be mitigated prior to implementation of a project. These measures would be determined when site specific development proposals are received.

3.15 Visual Resources

Affected Environment

Visual Resource Management (VRM) is BLM's systematic approach to inventorying and managing visual resource values, as mandated by Federal legislation (FLPMA, 1976 and NEPA,

1969). It includes the evaluation of public lands for assignment of inventory classes during Resource Management Plan (RMP) development, as well as the determination of management of Visual Resource Management (VRM) classes and the routine operational management of those classes. The VRM enables the BLM to have a system for managing the human concern for scenery and public acceptance for visible changes to the natural landscape setting. Through this system, the BLM is able to objectively measure proposed landscape altering projects for compliance to visual performance standards and apply the use of good design principles to satisfy management objectives.

BLM manages landscapes according to the Visual Resource Management Manual (H-8431-1). VRM Classes establish specific objectives on the management of visual resource values. The VRM objectives set the standards for the planning, design, and evaluation of proposed projects. The VRM classes consider the compatibility between land use decisions and visual values. Management Objectives range from preserving the natural landscape (VRM Class I) to providing for activities that result in major modification of the existing landscapes (VRM Class IV).

VRM are based on a process that considers scenic quality, sensitivity to changes in the landscape and distance zone. The four VRM classes are numbered I to IV; the lower the number, the more sensitive and scenic the area. Each class has a management objective, which prescribes the level of acceptable change in the landscape. The objectives are guidelines that are used with the visual resource contrast rating system during new project-level planning. The management objectives will not preclude the maintenance of existing structures and range improvements.

Visual Resource Management (VRM) classes only apply to BLM surface; as such the affected environment for visual resources consists of approximately 4,942 acres of BLM -administered surface in the analysis area (**Table 16**). For non-federal surface lands, BLM does not have the authority to manage for VRM and there is no visual resource inventory of VRM class. The proposed lease parcels includes lands that have been identified as VRM II (120 acres; 3%), III (3,814 acres; 77%), and IV (1,008 acres; 20%) (**Table 16**). The VRM class objectives are defined as follows:

Class II: The objective of this class is to preserve the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV: The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major

focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture in the natural characteristic landscape.

In VRM Class I, II, III, and IV areas the BLM may prohibit surface-disturbing activities if such activities are not designed to meet the intent of the VRM Class objectives.

In VRM Class II areas the BLM will reduce the visual contrast on BLM land in the existing landscape by utilizing proper site selection, reducing soil and vegetative disturbance, choice of color, and over time, returning the disturbed areas to a seamless, natural landscape.

Parcel MTM 108952-BQ is designated as Class II. Stipulation CSU 12-64 would apply to this parcel, which states, "in order to retain the existing character of the landscape, oil and gas development activities will be located, designed, constructed, operated, and reclaimed so that activities should not attract attention to the casual observer within 2 years from initiation of construction. This stipulation does not apply to the operation and maintenance activities."

Table 16: VRM Classes for BLM surface

Leasing Areas ***Italic=Split Surface Ownership***	**VRM Class II Acres**	**VRM Class III Acres**	**VRM Class IV Acres**
MTM 79010-A8		200.43	
MTM 79010-B4		120	
MTM 79010-A4		40	
MTM 79010-B9 *(280 private)*		*80*	
MTM 79010-C1		240	
MTM 79010-HS *(163.53 private)*		*284.14*	
MTM 79010-HQ		9.81	
MTM 105431-HR			600
MTM 105431-HT			160
MTM 108952-FC			120
MTM 108952-CU			7.28
MTM 108952-BQ *(80 private)*	*120*		
MTM 108952-E6		160	
MTM 108952-FB		840	
MTM 108952-E7 *(80 private)*		*360*	
MTM 108952-E8		560	
MTM 108952-E9 *(40 private)*		*880*	
MTM 108952-FA *(360 private)*		*40*	
MTM 79010-PX *(200 private)*			*120.50*

Environmental Consequences

The potential direct, indirect, and cumulative impacts from oil and gas development on visual resources are discussed in the HiLine RMP and FEIS (pages 680-692) and incorporated by reference. Offering 24 parcels for lease would have no direct impacts on visual resources

because no surface disturbance would occur. Any potential effects on visual resources from the sale of lease parcels would occur at the time the leases are developed at the APD stage.

Development of a lease parcel undergoes a complete NEPA analysis during the Application for Permit to Drill (APD) stage of development. Should any new oil and gas developments occur, the following disturbance is possible; up to 11 wells with a range of 31.35 to 57.2 acres of short-term disturbance and 8.25 to 9.9 acres of long-term disturbance. They would be subject to BLM BMPs for VRM in order to minimize contrasts to the existing landscape. This includes such things as proper site selection, minimizing disturbance, selecting color schemes that blend with the background, and reclaiming areas that are not in active use. Overall, the goal is to minimize impacts to the existing visual resources that currently exist and to ensure conformance with the VRM class of the area.

Based upon the application of BLM BMPs to minimize contrasts to the existing landscape, and CSU 12-64 on Parcel MTM 108952-BQ (the only parcel with a Class II VRM), potential impacts from oil and gas development would be extremely low. Any additional site-specific impacts would be addressed during the APD. Development activities on all parcels located on BLM surface would be mitigated so that contrasts conform to VRM class guidelines. Oil and gas development activities on private surface would be guided by BMPs and other resource mitigation measures.

3.16 Recreation

Affected Environment

The Cottonwood Riparian Area is the only designed recreation site located in close proximity to any of the 24 parcels in the lease sale. The recreation area is classified as an Extensive Recreation Management Area (ERMA) which requires specific management consideration but is commensurate with the management of other resources and resource uses. The recreation area has a vault toilet, picnic tables and a wildlife exclosure and is primarily used for canoeing, kayaking, fishing, hiking, hunting, and wildlife watching. Parcel MTM 79010-HQ is adjacent to Cottonwood Riparian Area and NSO 11-140 states that surface occupancy and use is prohibited within and 500 feet from recreation sites.

Environmental Consequences

Offering 24 parcels for lease would have no direct impacts on recreation because no surface disturbance would occur. Any potential effects on recreation from the sale of lease parcels would occur at the time the leases are developed at the APD stage.

The objective of NSO 11-140 is to recognize and protect the public's opportunity for quality recreation experiences and developed recreation sites. The intent of the objective is to perpetuate those opportunities for which the site was developed, reduce the visual intrusion and noise, and protect capital investments.

Effects to the Cottonwood Riparian Area would likely be negligible with the stipulation in place. However, it is possible that a 500 foot buffer may not adequately protect the site and there may be visual and noise impacts that could disrupt the recreational experience. If the lease parcel is developed, proper site selection, minimizing disturbance, selecting color schemes that blend with background, and reclaiming areas that are not in active use will help reduce the impacts to recreation.

3.17 Lands and Realty

Affected Environment

Malta Field Office. Eight of the twenty-four lease parcels are located in Phillips County, administered out of the Malta Field Office. Six of these parcels have a BLM authorized rights-of-ways (ROW) within the proposed lease parcels. Parcel MTM 79010-B4 has an associated abandoned railroad (MTGF0073441) and an irrigation reservoir (MTM0040415). Parcel MTM 79010-A4 has an associated irrigation reservoir (MTM0040415). Parcel MTM 79010-B3 has an associated irrigation reservoir (MTM0040415). Parcel MTM 79010-B9 has an associated irrigation reservoir (MTM0040280). Parcel MTM 79010-HS has two associated aerial power line (MTM57527 andMTM94310). Parcel MTM 79010-HQ has an associated buried telecommunication line (MTM42551) and aerial power line (MTM57527).

Glasgow Field Office. Two of the twenty-four lease parcels are located in Valley County, administered out of the Glasgow Field Office. No parcels have a BLM authorized rights-of-ways (ROW) within the proposed lease parcels.

Havre Field Office. Fourteen of the twenty-four lease parcels are located in Chouteau County, Liberty County, Hill County, Blaine County, and Glacier County, all administered out of the Havre Field Office. Five of these parcels have a BLM authorized rights-of-ways (ROW) within the proposed lease parcels. Parcel MTM 108952-FC has an associated reclamation ROW (MTM13731). Parcel MTM 108952-BQ has an associated oil and gas pipeline ROW (MTM61174) and an aerial powerline (MTM61177). Parcel MTM 108952-E9 has an associated oil and gas road ROW (MTM91594). Parcel MTM 108952-FA has an associated oil and gas road ROW (MTM91515). Parcel MTM 108952-FA has an associated irrigation reservoir (MTM0040437).

Environmental Consequences

Offering 24 parcels for lease would have no direct impacts on lands and realty because no surface disturbance would occur. Any potential effects on lands and realty from the sale of lease parcels would occur at the time the leases are developed at the APD stage.

Measures would need to be taken to avoid disturbance to or impacting existing rights-of-way on federally administered surface in the event that the leased parcels are developed. Right-of-way holders will be notified of the lease sale, if offered, and potential lease buyers would be notified of existing ROW's and potential conflicts with development. Any new or "off-lease rights-of-

way required across federal surface for future exploration and/or development of the parcel would be subject to a separate review and be subject to stipulations to protect other resources as determined by environmental analysis which would be completed on a case-by-case basis.

3.18 Social and Economic Conditions

Affected Environment

Social and Environmental Justice

This section focuses on the counties containing the parcels proposed for leasing: Blaine, Chouteau, Glacier, Hill, Liberty, Phillips and Valley. The social and economic environment of these counties is described in detail in the Hiline ARMP and FEIS (3-369 through 3-378; BLM, 2015) so there is only a brief description provided here. U.S. Census Bureau estimates for 2016 indicate a population of 56,799 residents across the seven counties (U.S. Census Bureau, 2016a). Based upon the U.S. Census population estimates data for 2015, the two most populated counties with parcels nominated for leasing were Hill County with a population of 16,572 residents and Glacier County with a population of 13,647 residents (U.S. Census Bureau, 2016a). Valley County had an estimated population of 7,659 residents in 2016 and Blaine County had an estimated population of 6,577 (U.S. Census Bureau, 2016a). Chouteau and Phillips Counties had an estimated population of 5,767 and 4,169 respectively. Liberty is the least-populated county considered, with a 2016 population estimate of 2,408 residents (U.S. Census Bureau, 2016a).

Executive Order 12898 (Feb. 11, 1994), Federal Actions to Address Environmental Justice in Minority and Low-Income Populations states "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" Analysis requires the identification of minority populations and low-income populations that may be affected by any of the alternatives.

The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. It is important to note that minority populations, low-income populations, or Tribes may experience common effects from a project even if they do not reside in the immediate study area. EO 12898 requires Federal agencies to ensure opportunities for effective public participation by potentially affected low-income populations, minority populations, or Indian tribes. These populations are considered to be potential "environmental justice populations" of concern that should be addressed throughout the planning effort.

Minority populations as defined by Council on Environmental Quality (CEQ) guidance under the National Environmental Policy Act (CEQ 1997) include individuals in the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified where "(a) the minority population of the

affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater" (CEQ 1997). Additionally, "[a] minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997).

Low-income populations are determined by the U.S. Census Bureau based upon poverty thresholds developed every year. Poverty thresholds are set by the U.S. Census Bureau. CEQ guidance does not provide specific criteria for determining low-income populations as it does for minority populations, so for this project we will use the same criteria as is being used for minority populations (50 percent or greater of the population or a population that is "meaningfully greater"). We identify low-income population and minority population percentages that are "meaningfully greater" as at least five percentage points higher than for the State of Montana.

Minority populations are identified using the U.S. Census Population Estimates program which provides estimates for the resident population by age, sex, race, and Hispanic origin at the national, state and county scales. Total minority population refers to that part of the total population which is not classified as *Non-Hispanic White Only* by the U.S. Census Bureau. By using this definition of minority population, the percentage is inclusive of Hispanics and multiple race categories and any other minority single race categories. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

Table 17: Population and Poverty Estimates for Environmental Justice Populations, 2015 Estimates

Geography	Total Population[1]	Race Alone[1]					% Two or More Races[1]	% Hispanic[1]	% total minority[2]	Poverty Percent, All Ages[3]
		% White	% Black or African American	% American Indian and Alaska Native	% Asian	% Native Hawaiian and Other Pacific Islander				
Montana	1,032,949	89.2%	0.6%	6.6%	0.8%	0.1%	2.7%	3.6%	13.5%	14.4%
5% points greater	--	--	5.6%	11.6%	5.8%	5.1%	7.7%	8.6%	18.5%	19.4%
Blaine County, Montana	6,577	48.0%	0.3%	48.9%	0.3%	0.0%	2.5%	2.6%	52.9%	29.6%
Chouteau County, Montana	5,767	77.2%	0.2%	20.4%	0.5%	0.1%	1.6%	2.4%	24.2%	17.6%
Glacier County, Montana	13,647	33.4%	0.2%	62.8%	0.4%	0.0%	3.2%	2.7%	67.6%	28.1%
Hill County, Montana	16,572	72.6%	0.5%	22.7%	0.7%	0.1%	3.4%	3.4%	29.2%	21.2%
Liberty County, Montana	2,408	97.6%	0.3%	0.7%	0.1%	0.0%	1.3%	1.1%	3.2%	17.0%
Phillips County, Montana	4,169	86.6%	0.1%	8.3%	0.4%	0.0%	4.6%	2.1%	15.0%	16.4%
Valley County, Montana	7,659	86.6%	0.5%	9.7%	0.8%	0.1%	2.3%	2.3%	15.1%	12.1%

[1]U.S. Census Bureau, 2016a. Table PEPSR6H: Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States, States, and Counties: April 1, 2010 to July 1, 2015. Release date June 2016. U.S. Census Bureau, Population Division. Accessed December 29, 2016 from: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

[2]The term "total minority population" refers to the part of the total population which is not classified by the race/ethnicity category Non-Hispanic White Alone by the U.S. Census Bureau. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

[3]U.S. Census Bureau, 2016b. 2015 Poverty and Median Household Income Estimates - Counties, States, and National. Release date December 2016. Accessed 12-29-2016 from http://www.census.gov/did/www/saipe/data/statecounty/data/2015.html

For the counties covered in this EA, the only racial category with significant environmental justice populations were American Indians and Alaska Natives. As shown in Table 1, in Blaine, Chouteau, Glacier, and Hill Counties these populations met the criteria of Environmental Justice minority populations. In Glacier County, American Indians and Alaska Natives represent over one-half (63%) of the population, while in the other three counties these groups represent 20% or more of their county's overall population. Statewide, 6.6% of Montana's population is American Indian or Alaska Native.

Data for the identification of low-income populations is from the U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE). The SAIPE program annually produces single year poverty estimates for states, counties, and school districts. The U.S. Census Bureau suggests using SAIPE data for poverty estimates for counties or school districts, especially for areas with populations of 65,000 or less (U.S. Census Bureau, 2016b). Estimates from SAIPE and the Population Estimates program are used in federal funding allocations.

Based upon this data, Blaine, Glacier and Hill counties met the criteria for a low-income environmental justice population. In Blaine County, 29.6% of residents lived in poverty while in Glacier County the percentage living in poverty was 28.1%. In Hill County, 21.2% of residents lived in poverty. Statewide, 14.4% of Montana residents lived in poverty.

Economics

Parcels nominated for leasing in March 2018 are located in the Montana counties of Blaine, Chouteau, Glacier, Hill, Liberty, Phillips and Valley. Economic conditions and trends for the region are discussed in more detail in the Hiline ARMP and FEIS (3-369 through 3-378; BLM, 2015) so this discussion is focused on economic aspects related to oil and gas lease sales.

Mineral rights can be owned by private individuals, corporations, Indian tribes, or by local, State, or Federal Governments. Typically companies specializing in the development and extraction of oil and gas lease the mineral rights for a particular parcel from the owner of the mineral rights. Federal oil and gas leases are generally issued for 10 years unless drilling activities result in one or more producing wells. Once production has begun on a Federal lease, the lease is considered to be held by production and the lessee is required to make royalty payments to the Federal Government.

Section 3.2 provides information on existing oil and gas leasing for the seven counties that have parcels nominated for leasing in March 2018. The leasing and development of these minerals supports local employment and income and generates public revenue for surrounding communities. The economic contributions of Federal fluid minerals are largely influenced by the number of acres leased and estimated levels of production and can be measured in terms of the jobs, income, and public revenue it generates. Additional details on the economic contribution of Federal fluid minerals are discussed in the Hiline ARMP and FEIS (3-369 through 3-378; BLM, 2015).

Leasing mineral rights for the development of Federal minerals generates public revenue through the bonus bids paid at competitive lease auctions and annual rents collected on leased parcels not

held by production. Nominated parcels approved for oil and gas leasing are offered by the BLM at a minimum bid rate of $2.00 per acre at the competitive lease sale. In addition to bonus bids, lessees are required to pay rent annually until production begins on the leased parcel, or until the lease expires. These rent payments are equal to $1.50 an acre for the first five years and $2.00 an acre for the second five years of the lease. Additionally, Federal oil and gas production in Montana is subject to production taxes or royalties. The Federal oil and gas royalties on production from public domain minerals equal 12.5 percent of the value of production (43 CFR 3103.3.1).

A portion of the revenues collected by the Federal government is distributed to the state and counties in which the oil and gas was produced. The amount that is distributed is determined by the federal authority under which the Federal minerals are being managed. Forty-nine percent of Federal revenue associated with from oil and gas from public domain lands are distributed to the state. In Montana, 25% of the royalty revenues that the state receives are redistributed to the counties of production (Title 17-3-240, MCA). Twenty-five percent of royalties and revenues associated with oil and gas development from Federal lands acquired under the Bankhead-Jones Act are distributed to counties of production. Distribution of federal royalties and leasing revenues to the state for oil and gas development on other federal acquired lands differs based upon the authority associated with those lands. Generally the revenue associated with oil and gas leasing and development that is received by the state and counties help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and/or keeping records. Other county functions that may be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

Environmental Consequences

Social and Environmental Justice

The direct, indirect, and cumulative impacts from oil and gas development on social conditions and environmental justice populations are discussed Hiline ARMP and FEIS (4-497 through 4-511; BLM, 2015) and are incorporated by reference into this EA. The analysis indicates that the pace and scale of oil and gas development can often concern local communities. Rapid development can drive important social changes due to the influx of people to these areas who find employment in the oil and gas industry and ancillary service industries. Rapid population growth for unprepared communities can cause stress on community resources such as educational infrastructure, roads and utilities, emergency services, and community cohesion. Should oil and gas leasing and subsequent development occur, impacts to people living near or using the area in the vicinity of the lease would potentially occur. Oil and gas exploration, drilling, or production, would potentially inconvenience these people through increased traffic and traffic delays, noise, and visual impacts. These impacts would be particularly noticeable in rural areas in which oil and gas development has not occurred previously. The level of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, the length of time and season in which these activities occurred, and other factors. Creation of new access roads would potentially allow increased public access and exposure of

private property to vandalism. For leases in which the surface is privately owned and the mineral estate is federally owned, surface owner agreements, standard lease stipulations, and BMPs would potentially address many of the concerns of private surface owners.

Executive Order 12898 requires the analysis of disproportionately high and adverse human health effects and environmental effects on environmental justice populations. Environmental effects may include "ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment" (page 26; CEQ, 1997). As discussed in in the affected environment, based upon U.S. Census Bureau data, Blaine, Glacier and Hill counties met both the criteria for having a low-income environmental justice population, and, due to the percent of residents identifying themselves as American Indian/Alaska Native, minority environmental justice populations. In addition, Chouteau County met the criteria for having a minority environmental justice population. Adverse effects to historical and current cultural and traditional uses and values in this area are correlated to the amount of surface-disturbing or other disruptive activities allowed under the proposed action. The RFD estimates that 11 wells could be constructed, resulting in a range of 31.35 to 57.2 acres of short-term disturbance and 8.25 to 9.9 acres of long-term disturbance (See Section 3.2). Please refer to sections 3.12 Cultural Resources and 3.13 Native American Religious Concerns for the discussion of potential impacts associated with this alternative. The BLM has considered all input from persons or groups regardless of age, income status, race, or other social or economic characteristics. The outreach and public involvement activities taken by the HiLine District for this effort, including the consultation of tribes, are described in sections 1.6 Public Involvement, and 4.2 Persons, Agencies, and Organizations Consulted.

Economics

The collection of revenues would result from leasing the parcels under the proposed action. Revenues generated by leasing Federal minerals are the bonus bids paid at the competitive lease auction and annual rents collected on leased parcels not held by production. These revenues are collected by the Federal government which then distributes a portion of the revenues collected to the state and counties. The amount that is distributed is determined by the federal authority under which the Federal minerals are being managed. Forty-nine percent of Federal revenue associated with oil and gas from public domain lands are distributed to the state. In Montana, 25% of the royalty revenues that the state receives are then redistributed to the counties of production (Title 17-3-240, MCA). Twenty-five percent of royalties and revenues associated with oil and gas leasing and development from Bankhead-Jones lands are distributed to counties of production. Distribution of federal royalties and leasing revenues to the state for oil and gas leasing and development on other federal acquired lands differs based upon the authority associated with those lands.

Table 18: Estimated Federal Revenue Associated with the March 2018 Lease Sale Federal Revenue

County	Acres	Average Annual (nominal)		One-time Revenue
		Rent-first 5 years	Rent-second 5 years	Bonus Bid
		$1.50/acre	$2.00/acre	Min. $2.00/acre
Blaine	3,880.5	$5,821	$7,761	$7,761
Choteau	240.0	$360	$480	$480
Glacier	280.0	$420	$560	$560
Hill1	127.3	$191	$255	$255
Liberty	120.0	$180	$240	$240
Phillips1	1,484.0	$2,226	$2,968	$2,968
Valley1	760.0	$7,821	$10,428	$10,428
Total	6,891.8	$10,337.70	$13,783.60	$13,783.60

Federal leasing revenue estimates (lease rent and bonus bids) are initially based upon the number of acres being offered, however it is unknown whether all of the parcels proposed will be sold. Due to energy market volatility and the dynamics of the oil and gas industry the BLM cannot predict the exact effects of this action, as there are no guarantees that the leases will receive bids, and that any leased parcels will be developed or that developed parcels will produce any fluid minerals. Given this uncertainty, revenue estimates are calculated under the assumption that one hundred percent of the proposed parcels are sold. Federal leasing revenue estimates provided in Table 2 are associated with the parcels offered under the proposed action and do not include existing lease rents. To estimate annual rent revenue it was assumed that rent would be collected during the full term of the leases (10 years) since it is unknown if and when the lease will be held by production, terminated, or relinquished. This calculation of rent revenue provides the maximum amount of annual rent revenue that may be collected. Bonus bids were calculated using the minimum rate of $2.00 per acre. Given the numerous uncertainties mentioned above, only potential federal revenue is calculated and discussed.

Lease parcels in Valley County could generate the greatest amount of Federal revenue with annual rent ranging from $7,821 for the first five years and $10,428 for the second five years and a one-time bonus bid revenue of $10,428, assuming one hundred percent of the proposed parcels are sold (Table 2). Blaine County could generate $5,821 in annual rent for the first five years and $7,761 for the second five years and a one-time bonus bid revenue of $7,761 (assuming one hundred percent of the proposed parcels are sold) while in Phillips County annual rents the first five years would be $2,226 and $2,968 for the second five years, with bonus bids totaling $2,968. Liberty and Hill Counties have the fewest acres up for sale (120 and 127.3 respectively) and under the assumptions of this analysis would generate the least amount of Federal revenue, with annual rents of $180 (Liberty) and $191 (Hill) for the first five years, $240 (Liberty) and $255 (Hill) for the second five years and a one-time bonus bid revenue of $240 (Liberty) and $255 (Hill). Based upon the number of acres proposed for leasing, Valley, Glacier, and Chouteau counties would likely generate more Federal revenue than Hill or Liberty County, but less than Blaine or Phillips counties (Table 2).

The direct, indirect, and cumulative impacts from potential oil and gas development are discussed in Chapter 4 of the Hiline ARMP and FEIS (4-497 through 4-511; BLM, 2015. Oil and gas development affect employment and labor income generated by 1) payments to counties associated with the leasing and rent of Federal minerals, 2) royalty payments associated with

production of Federal oil and gas, and 3) economic activity generated from drilling and associated activities. The magnitude of these types of economic effects is based upon the level and pace of development which is unknown at this time.

CHAPTER 4 - CONSULTATION AND COORDINATION

4.1 Introduction

The BLM posted notice of this project in the NEPA Register on the BLM's ePlanning website on August 14, 2017 (scoping) and on September 29, 2017 (Environmental Assessment): https://eplanning.blm.gov/epl-front-office/eplanning/lup/lup_register.do.

4.2 Persons, Groups, and Agencies Consulted

The BLM consulted with the following tribes, organizations and agencies during the preparation of this document, as well as notified private surface owners of the proposed lease sale.

Government / Agencies:

- Phillips County Board of County Commissioners, Malta, MT
- Valley County Board of County Commissioners, Glasgow, MT
- Hill County Board of County Commissioners, Havre, MT
- Blaine County Board of County Commissioners, Chinook, MT
- Chouteau County Board of County Commissioners, Fort Benton, MT
- Liberty County Board of County Commissioners, Chester, MT
- Glacier County Board of County Commissioners, Cut Bank, MT
- Montana Fish, Wildlife, and Parks (FWP), Glasgow, MT
- Montana Fish, Wildlife, and Parks (FWP), Havre, MT
- Montana DNRC, Northern District Field Office, Shelby, MT
- Montana DNRC, Trust Land Management Headquarters, Helena, MT
- Bureau of Indian Affairs; US Dept. of Interior
- Bureau of Reclamation, Billings, MT
- Dept. of Homeland Security; Border Patrol Facilities & Tactical Infrastructure, Washington D.C.
- Montana Historical Society, Helena, MT
- National Park Service, Denver, CO
- US Army Corps of Engineers, Omaha, NE
- US Customs and Border Protections, Washington D.C.
- US Fish and Wildlife Service, Denver, CO

Tribes:

- Blackfeet Tribal Business Council, Browning, MT
- Chippewa Cree Tribe, Box Elder, MT
- Confederated Salish and Kootenai Tribes, Pablo, MT
- Crow Tribe, Crow Agency, Montana
- Fort Belknap Indian Community, Harlem, MT
  Ft. Peck Tribes, Poplar, MT
- Northern Cheyenne Tribe, Lame Deer, MT

4.3 List of Preparers

HiLine Interdisciplinary Team

Name	Resource
Amy Waring / Tessa Wallace	NEPA co-leads
Jason Snellman	Recreation
Abby Hall	Range (Havre)
Hal Moore	Range (Malta)
Ryan Allen	Range (Glasgow)
Josh Sorlie	Soils
Bonny Hammons	Hydrology
Craig Miller	Wildlife (Havre, Glasgow)
Kathy Tribby	Wildlife (Malta)
Micah Lee	Lands
Josh Chase	Cultural
Kenny Keever	Vegetation / Weeds (Havre)
Hal Moore	Vegetation / Weeds (Malta)
Ryan Allen	Vegetation / Weeds (Glasgow)
Kahindo Kamau	Oil & Gas RFD
Randy Schardt	GIS (Parcel generation)
Howard Williams	GIS
Merry Prestridge	Lands
Melissa Hovey	Air
Scott Rickard, Jessica Montag	Economics

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APPENDICES

A: Stipulations identified for parcels
B: Description of Stipulations
C: Parcel maps
D: Soils Appendix